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ENVIRONMENTAL MANAGEMENT SYSTEMS

ISO 14001 EMS Implementation Guide for the ➲ Metal Finishing Sector

SEPTEMBER 1999

CAMF

Alliance of
Manufacturers &
Exporters
Canada

Ministry of the Environment

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Alliance of Manufacturers & Exporters Canada

ISO 14001 EMS
Implementation Guide
for the
Metal Finishing Sector

Ontario Ministry of the Environment

with the support of the
Canadian Association of Metal Finishers

Ontario

CAMF

Alliance of
Manufacturers &
Exporters
Canada

PIBS 3805e

ISO 14001 EMS Implementation Guide for the Metal Finishing Sector

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The Ministry of the Environment and the Alliance encourage the distribution of the Guideto support the continuing trend of organizations to pursue ISO 14001 and to implement a program of continual improvement, both financial and environmental.

Part 1

Introduction

1.0 Introduction

This ISO 14001 sector guide - co-sponsored by the Ministry of Environment and the Alliance of Manufacturers & Exporters Canada - is designed to assist metal finishers become compliant with ISO 14001, the international environmental management system standard (EMS), and to help them maintain the system once compliant.

It comprises eight sections:

- What is ISO 14001
- Three "rules of three"
- Getting Started
- Benchmarking your company against ISO 14001
- Implementing ISO 14001
- Measuring progress
- Registration / compliance
- Sources of assistance

Generic Information

The generic information in the sector guide focuses on the "what" and "why" of ISO 14001 and provides information applicable to a company from any industrial sector.

Figure 1 illustrates the three components of the sector guide.

Figure 1

Generic Information	Sector Specific Information	Measurement
• what is ISO 14001 • three "rules of Three" • getting started • benchmarking your company against ISO 14001 • registration / compliance • sources of assistance	• Implementing ISO 14001	• Measuring Progress

Sector Specific Information

This section focuses on the implementation phase and the identification of aspects and impacts specifically related to the metal finishing sector.

Measurement

This section relates to the setting of objectives and targets for metal finishing companies.

Metal Finishing Sector

The metal finishing industry generates sales of approximately $800 million a year. It has about 600 Canadian companies, of which approximately:

- 60 per cent are in Ontario:
- 15 per cent are in Quebec:
- 11 per cent are in British Columbia:
- 8 per cent are in Alberta.

The industry is defined as those plants that undertake the following operations:

• mechanical deburring / sandblasting;	• hot dip galvanizing;
• electroplating;	• electroless plating;
• electrocleaning;	• anodizing;
• alkaline cleaning;	• acid pickling;
• acid bright dipping;	• stripping electrodeposits;
• etching;	• chemical conversion coating;
• electropolishing;	• electronic-component operations.

About 75 per cent of metal finishing companies are job shops - that is firms which do not own the products being finished but are contracted by other manufacturers to provide metal finishing services.

Fifty per cent of metal finishing companies employ less than 20 people, only 20 per cent of all metal finishers employ more than 49 people.

Environmental issues are a major concern to the industry.

Part 2

What is ISO 14001?

2.0 What is ISO 14001?

This section defines an environmental management system. It describes ISO 14001 in terms of other kinds of environmental management systems; relates ISO 14001 to other quality award criteria, along the total quality spectrum; and describes the ISO 14000 family of standards and guidelines, with particular reference to ISO 14004. As well it compares ISO 14001 to ISO 9000; describes the ISO 14001 infrastructure; identifies environmental activities, aspects and impacts; and, finally, focuses on environmental objectives and targets.

2.1 Environmental Management System (EMS)

An environmental management system is that aspect of an organization's overall management that addresses the immediate and long-term impact of its products, services, and processes on the environment.

An EMS provides order and consistency in the allocation of resources, assignment of responsibilities, and an on-going evaluation of those practices, procedures and processes that relate to the organization's impact on the environment.

2.2 Four EMS Standards

There are four main types of EMS standards, namely:

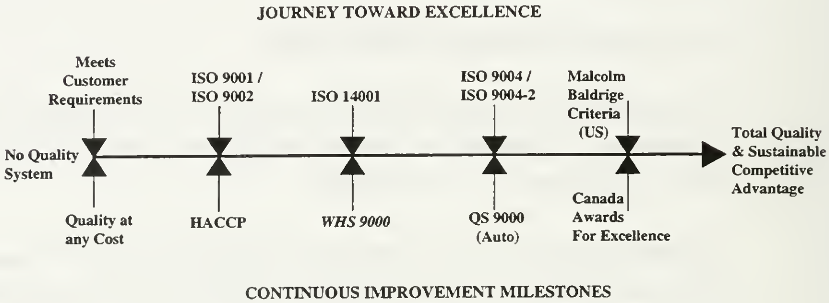
- industry EMS standards (for example, the chemical industry's Responsible Care);
- national EMS standards (e.g.: Ireland, Spain);
- "supra" national EMS standards (specifically the European Unions EMAS), and
- international EMS standard - ISO 14001.

2.3 ISO 14001 and Total Quality

ISO 14001 is one of a number of continuous improvement milestones and a component of a total quality system.

Figure 2 identifies where ISO 14001 fits among a variety of systems and awards on a continuum towards total quality.

Figure 2


JOURNEY TOWARD EXCELLENCE
Meets Customer Requirements
ISO 9001 / ISO 9002
ISO 14001
ISO 9004 / ISO 9004-2
Malcolm Baldrige Criteria (US)
No Quality System
Total Quality & Sustainable Competitive Advantage
Quality at any Cost
HACCP
WHS 9000
QS 9000 (Auto)
Canada Awards For Excellence
CONTINUOUS IMPROVEMENT MILESTONES

2.4 ISO 14000: A Family of Guidelines and Standards

ISO 14000 is a "family" of environmental standards comprising three main categories of standards and guidelines:

Management system standards

- ISO 14001 - environmental management systems
- ISO 14004 - general guidelines on principles, systems and supporting techniques

These are the two standards and guidelines to which a company seeking compliance with ISO 14001 will relate. Other standards of interest include:

Organizational Evaluation Standards

- ISO 14010 / 11 / 12 - third party environmental auditing

These are the standards to which third party registrars must comply

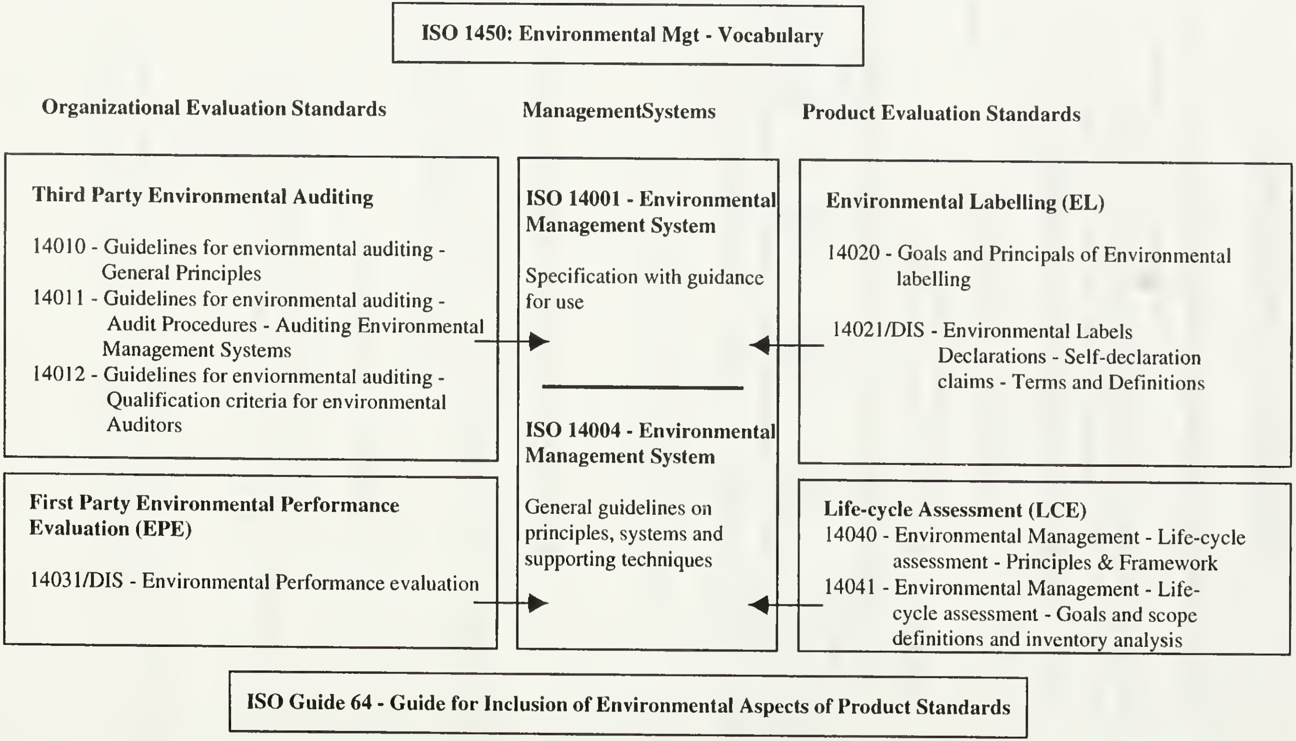
- 14031 - first party environmental performance evaluation

Product Evaluation Standards

- ISO 14020 /21 / 22 / 23 / 24 - environmental labeling
- ISO 14041 / 42 / 43 / 44 - life-cycle assessment (these standards are still being developed)

Like ISO 9001, ISO 14001 relates to managing a company's processes and activities. Figure 3 illustrates some of the main standards in the ISO 14000 "family".

Figure 3



ISO 1450: Environmental Mgt - Vocabulary

Organizational Evaluation Standards

Third Party Environmental Auditing

14010 - Guidelines for enviornmental auditing - General Principles
14011 - Guidelines for environmental auditing - Audit Procedures - Auditing Environmental Management Systems
14012 - Guidelines for enviornmental auditing - Qualification criteria for environmental Auditors

First Party Environmental Performance Evaluation (EPE)

14031/DIS - Environmental Performance evaluation

ManagementSystems

ISO 14001 - Environmental Management System

Specification with guidance for use

ISO 14004 - Environmental Management System

General guidelines on principles, systems and supporting techniques

Product Evaluation Standards

Environmental Labelling (EL)

14020 - Goals and Principals of Environmental labelling

14021/DIS - Environmental Labels Declarations - Self-declaration claims - Terms and Definitions

Life-cycle Assessment (LCE)
14040 - Environmental Management - Life-cycle assessment - Principles & Framework
14041 - Environmental Management - Life-cycle assessment - Goals and scope definitions and inventory analysis

ISO Guide 64 - Guide for Inclusion of Environmental Aspects of Product Standards

2.5 ISO 14001: Environmental Management System - Specifications

ISO 14001 is the international standard against which your environmental management system can be judged.

A company can only be registered to ISO 14001. All other ISO 14000 standards are guidance documents or relate to other "players", e.g., registrars, in the ISO 14000 infrastructure.

The ISO 14001 standard covers six main areas, as follows:

- 4.1 General requirements
- 4.2 Environmental Policy
- 4.3 Planning
  - 4.3.1 Environmental aspects
  - 4.3.2 Legal and other requirements
  - 4.3.3 Objectives and targets
  - 4.3.4 Environmental management program(s)
- 4.4 Implementation and operation
  - 4.4.1 Structure and responsibility
  - 4.4.2 Training, awareness and competence
  - 4.4.3 Communication
  - 4.4.4 Environmental management system documentation
  - 4.4.5 Document control
  - 4.4.6 Operational control
  - 4.4.7 Emergency preparedness and response
- 4.5 Checking and corrective action
  - 4.5.1 Monitoring and measurement
  - 4.5.2 Nonconformance and corrective and preventive action
  - 4.5.3 Records
  - 4.5.4 Environmental management system audit
- 4.6 Management review

2.6 ISO 14004: Environmental Management Systems - General Guidelines on Principles, Systems and Supporting Techniques

ISO 14004 explains fundamental environmental management concepts, defines key terms, and provides guidance using principles and a step-by-step walk through of how to tailor an EMS to a particular company.

Before deciding if your company should implement the standard, the guidance document recommends that you do a pre-(benchmark) assessment that should include:

- the identification of legislative and regulatory requirements,
- the identification of environmental aspects, significant environmental impacts, and liabilities,
- the evaluation and documentation of significant environmental issues,
- the evaluation of performance compared with relevant internal criteria, external standards, regulations, codes of practice, and sets of principles and guidelines,
- the identification of existing environmental management practices and procedures,
- the identification of the policies and procedures dealing with procurement and contracting activities,
- feedback from the investigation of previous incidents of noncompliance,
- the identification of opportunities for competitive advantage,
- the views of interested parties, and
- the identification of the functions or activities of other organizational systems that can enable or impede the company's environmental performance.

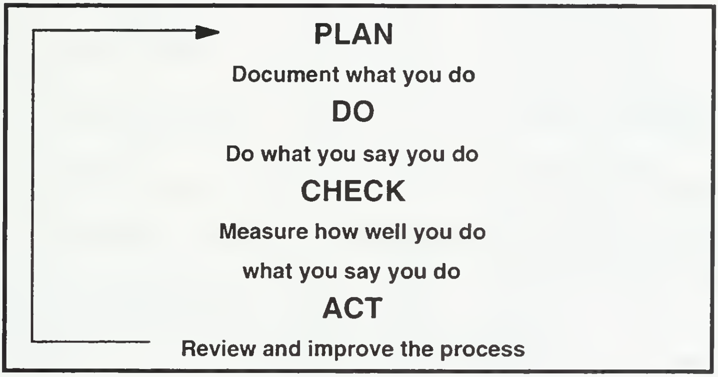
If you have not already done so, you should purchase the ISO 14001 and ISO 14004 standards from the sales division of the Standards Council of Canada (SCC), Global Info Centre Canada. See Section 9.3 for details on how to contact Global Info Centre Canada.

2.7 Relationship of ISO 14001 to ISO 9000 - How do they Compare?

If you are already registered to either ISO 9001 or ISO 9002 you are well on your way to meeting the requirements of ISO 14001 for several reasons.

- First, achieving ISO 9000 has enabled you to master the techniques of establishing policies, procedures and information systems required for ISO 14001;
- Second, you have established a culture in your company on which you can build and put in place the additional requirements of ISO 14001; and
- Third, both ISO 9000 and ISO 14000 are based on the four steps of the Deming principle - Plan, Do, Check, Act, as illustrated in Figure 4.

Figure 4



ISO 14001 registration demands that a .company's structure, responsibilities, policies, procedures, processes and resources that affect the environment (from management responsibility to training) are identified, documented, and functioning effectively according to requirements determined by the company and ISO 14001.

In effect, this requires internal auditing, management review, and the establishment of an environmental system with defined procedures, work instructions, and forms.

Figure 5 (see following page) compares the individual sections of ISO 9001 with those of ISO 14001 to see whether, and how, they align.

While the emphasis in ISO 14001 is on the environment, not on quality, compliance with either ISO 9001 or ISO 9002 gives a company a broad and deep foundation to achieve ISO 14001.

Figure 5

Correspondence between ISO 9001 and ISO 14001

ISO 9001: 1994		ISO 14001	
Description	**Element**	**Element**	**Description**
Management responsibility			
Quality policy	4.1.1	4.2	Environmental policy
	-	4.3.1	Environmental aspects
	- (1)	4.3.2	Legal and other requirements
	- (2)	4.3.3	Objectives and targets
	-	4.3.4	Environmental management program
Organization	4.1.2	4.4.1	Structure and responsibility
Management review	4.1.3	4.6	Management review
Quality system			
General	4.2.1(3)	4.1	General requirements
	4.2.1(4)	4.4.4	Environmental management system documentation
Quality system procedures	4.2.2	4.4.6	Operational control
Quality planning	4.2.3	-	
Contract review	4.3 (5)	4.4.6	Operational control
Design control	4.4	4.4.6	Operational control
Document and data control	4.5	4.4.5	Document control
Purchasing	4.6	4.4.6	Operational control
Control of customer supplied product	4.7	4.4.6	Operational control
Product identification and traceability	4.8	-	
Process control	4.9	4.4.6	Operational control
Inspection and testing	4.10	4.5.1 (6)	Monitoring & measurement
Control of inspection, measuring & test equipment	4.11	4.5.1 (7)	Monitoring & measurement
Inspection and test status	4.12	-	Operational control
Control of non-conforming product	4.13	4.5.2(8)	Non-conformance & corrective & preventive action
Corrective & preventive action	4.14	4.5.2 (9)	Non-conformance & corrective & preventive action
	-	4.4.7	Emergency preparedness & response
Handling, storage, packing, preservation and delivery	4.15	4.4.6	Operational control
Control of quality records	4.16	4.5.3	Records
Internal quality audits	4.17	4.5.4	Environmental management system audit
Training	4.18	4.4.2	Training, awareness and competence
Servicing	4.19	4.4.6	Operational control
Statistical techniques	4.20	-	
	-	4.3.3	Communications

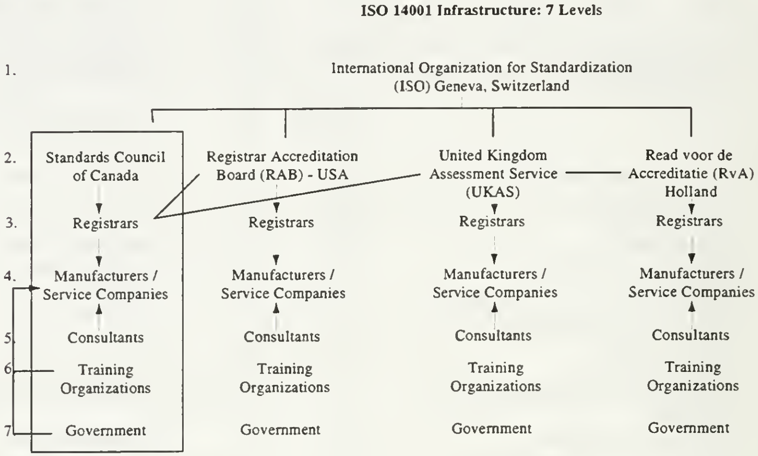
(1) Legal requirements addressed in ISO 9001, 4.4.4
(2) Objectives addressed in ISO 9001, 4.1.1
(3) 1st sentence
(4) without 1st sentence
(5) Communications with the quality stakeholders (customers)
(6) 1st & 3rd paragraph
(7) 2nd paragraph
(8) 1st part of 1st sentence
(9) without 1st part of 1st sentence

Source: ISO 14001: 1996

2.8 ISO 14000 Infrastructure / The Players: 7 Levels

A number of organizations are involved in the ISO 14000 infrastructure but the roles and responsibilities of seven standout as being particularly important. These seven "levels" of the ISO infrastructure are illustrated in Figure 6 and are:

Figure 6


ISO 14001 Infrastructure: 7 Levels
1.
International Organization for Standardization (ISO) Geneva, Switzerland
2.
Standards Council of Canada
Registrar Accreditation Board (RAB) - USA
United Kingdom Assessment Service (UKAS)
Read voor de Accreditatie (RvA) Holland
3.
Registrars
Registrars
Registrars
Registrars
4.
Manufacturers / Service Companies
Manufacturers / Service Companies
Manufacturers / Service Companies
Manufacturers / Service Companies
5
Consultants
Consultants
Consultants
Consultants
6
Training Organizations
Training Organizations
Training Organizations
Training Organizations
7
Government
Government
Government
Government

Level 1 - is the international level. The International Organization for Standardization (ISO), Geneva is a worldwide federation of national standards setting bodies of some 100 countries. Canada is represented by the Standards Council of Canada (SCC).

ISO develops international standards, such as ISO 14000, by consensus for voluntary implementation, over all technical fields, except for electrical and electrotechnical standardization.

Level 2 - is the national level. It consists of national accreditation organizations - in Canada this is the Standards Council of Canada.

The SCC accredits ISO 14000 third party registrars and training organizations.

Level 3 - consists of the third party ISO 14000 registrars. Most Canadian ISO 9000 registrars are seeking, or expect to seek, ISO 14001 accreditation;

Level 4 - consists of the manufacturers and service companies seeking ISO 14001 compliance;

Level 5 - consists of the consultants that provide ISO 14001 consulting advice;

Level 6 - consists of the organizations that provide ISO 14001 training;

Level 7 - consists of governments which may, and in some cases probably will, influence the speed and degree to which compliance to ISO 14001 is a requirement for doing business in their jurisdictions.

Part 3

Three "Rules" of Three

3.0 Three "Rules" of Three

This section identifies three "rules" for companies considering implementing ISO 14001.

3.1 Three Reasons for Compliance

Three main reasons why companies become compliant with ISO 14001 are:

- to demonstrate due diligence. In other words, to enable a company to show that it did everything it could reasonably be expected to do to avoid the incident, should a negative environmental "impact" occur. ISO 14001 provides a measure of protection to the company and can help the officers and directors "stay out of jail";
- to provide the company with a potential marketing edge. The company can claim that it is compliant with an international environmental management system, while its competitors are not.
- to become more competitive by reducing waste and thereby reducing costs, and improving the "bottom-line" and the environment.

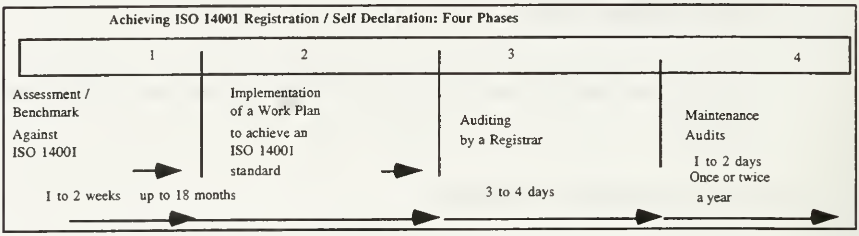
3.2 Three Phases Leading to Registration

There are three distinct phases leading to ISO 14001 compliance. These are:

- benchmarking your company against the ISO 14001;
- implementing a work program to bring your company's systems and procedures up to the standard; and
- becoming ISO 14001 compliant as a result of:
  - a third-party registrar or by your own staff (a self declaration of compliance); and
  - undertaking a maintenance audit once or twice a year by the registrar or a self audit.

Figure 7 illustrates these four phases and the average elapsed time of each phase.

Figure 7



Before embarking on this journey, however, it is essential that:

- top management is committed and prepared to be involved;
- all staff has been informed and everyone knows what is expected of them and how to do it;
- the right equipment, processes and tools are available in the proper sequence to do the job properly;
- the right information reaches the right people at the right time; and
- there is a system of management and control.

3.3 Three Levels of Management Communications

ISO 14001 provides three levels of management communications. These are:

- policies - the principles that the company uses to guide the behaviour of its employees with respect to its impact on the environment;
- procedures - the approaches employees are expected to follow to implement the policies; and
- work instructions - more detailed procedures for implementing the company's environmental policies.

Part 4

Getting Started

4.0 Three Ways to Implement ISO 14001: Pros and Cons

There are three ways to achieve ISO 14001 registration. These are:

- to implement the system using your own staff with no outside help - in other words: "to go it alone";
- to engage a consultant on a one-on-one basis to assist you benchmark and implement an ISO 14001 system; and
- to participate in a Group ISO 14001 assessment and implementation program.

Each alternative has positive and negative features and the choice should only be made after you have objectively assessed your company's strengths and weaknesses.

In other words, be sure you fully understand what is involved in benchmarking your company and implementing an ISO 14001 system before you decide on the route to follow.

This guide is designed to assist you regardless of which route you chose.

4.1 Going-It-Alone

A key decision is whether to use your own employees exclusively to put in your ISO 14001 system - i.e. to "go-it-alone" - or to supplement your internal resources with an external consultant.

Going it alone may work well for companies that can allocate sufficient, trained and knowledgeable people to the task. This may be difficult for smaller companies, however.

Regardless of size, another consideration is the extent to which internal company politics suggests an outsider may be best able to stimulate change on an on-going basis.

An external consultant is often a useful change agent able to provide the necessary expertise to supplement a company's own resources. For a variety of reasons, some companies prefer not to use outside consultants, including that they believe:

- they have the skills and people already within the company to do the job;
- that their own employees can be trained, if necessary, and it is the best way to go; and
- it will be cheaper.

4.2 Choosing and Using a Consultant

The second alternative is to hire a consultant to help you implement ISO 14001.

When hiring a consultant, here are some thoughts to keep in mind:

- select a consultant who has management systems experience. Remember, ISO 14001 is an environmental management system.
- ask whether the consultant has taken an ISO 14001 assessor or lead assessor course.

Accreditation as an ISO 14001 assessor is an important criterion in the selection of an ISO 14001 consultant. However, accreditation as an ISO 14001 auditor alone does not necessarily result in a good consultant.

Auditors, as opposed to consultants, look for conformance or non-conformance. Good consultants offer advice and guidance on how to close the gap between where you are and where you have to go, in addition to identifying conformance and non-conformance.

- Get competitive proposals from at least three consultants and check their references.
- Meet the consultant who will be doing the work in your company. Make sure the "chemistry" is right.

- Define what you expect from the consultant and look for his / her ability to achieve your expectations. For example, will the consultant:
  - conduct a benchmark assessment?
  - facilitate the implementation planning process?
  - help with technical solutions in addressing identified issues?
  - help senior management understand ISO 14001?
  - develop senior management's capability to implement?
  - get all employees involved in implementation and maintenance?
  - provide examples and support for the development of documentation (e.g., environmental manual, standard operating procedures, work instructions)?
  - develop a process for on-going monitoring and monthly reporting?
  - facilitate implementation through weekly meetings and project support?
  - help you design, develop and improve your environmental management system?
  - help in the selection of the registrar best suited to you?
  - help to identify legal compliance issues?

4.3 Group ISO 14001 Assessment and Implementation: Reducing Your Consulting Costs

The third alternative implementation route is designed to reduce a company's ISO 14001 consulting costs.

To achieve this, the Alliance has developed a Group ISO 14001 assessment and implementation training program for both manufacturers and service companies seeking to achieve ISO 14001 compliance.

The Group program involves three main elements as follows:

1. **A Benchmark Assessment**
   - a one day in-plant ISO 14001 benchmark assessment
   - an assessment report focusing on key opportunities for improvement

2. Program Elements

- 6 to 10 companies constitute a Group
- each Group meets monthly for 12 months in a centrally located classroom setting
- 1 or 2 expert ISO 14001 trainers at each Group workshop, depending on number of companies in a Group
- 3 representatives from each company can attend each workshop, including:
  - the CEO or facility manager who should attend each workshop
  - environmental/health and safety manager to attend each workshop
  - appropriate employee representation
- assignments reviewed by ISO 14001 trainers before each workshop
- each company receives assistance to upgrade its facility to the ISO 14001 standard
- 2 benchmark assessments relative to ISO 14001 are provided, one at the beginning of the process and one at the end
- 10 half days of one-on-one in-plant training provided between monthly sessions
- assistance in the selection of a registrar
- monthly status reports are reviewed by the ISO 14001 trainers one week prior to each monthly meeting with emphasis on resolving obstacles or issues
- opportunities for networking (e.g., environmental and health and safety managers and others can share information and discuss common problems)

3. A Pre-Registration Audit

- a one day in-plant benchmark ISO 14001 assessment
- an assessment report focusing on preparing for registration

Part 5

Benchmarking Against ISO 14001

5.0 Benchmark Assessment

This section describes the process for determining how compliant your company is with ISO 14001 and then describing the implementation steps required to become compliant.

A benchmark assessment or gap analysis of your company against ISO 14001 usually takes about two days and involves:

- an examination of your documented environmental management system, if any, to evaluate whether it addresses all of the sections of ISO 14001;
- the preparation of a report to management on the results of the assessment.

Figure 8 is sample page from the ISO 14001 checklist to illustrate the scoring system. The average Canadian company scores about 28 per cent of the standard. See also Appendix 3 for the complete ISO 14001 assessor checklist.

Figure 8

	S	NI	US	NA		1	2	3
4.3 Planning								
4.3.1 Environmental aspects								
1. Has the organization established and maintained a procedure to identify the environmental aspects of its activities, products, or services that it controls and over which it has an influence, to determine which have or can have significant impacts on the environment?		X						X
2. Are the aspects related to these significant impacts are considered in setting its environmental objectives?			X				X	
3. Is this information up-to-date?			X				X	
Totals 4.3.1						0	2	1

Notes:

S = Satisfactory	US = Unsatisfactory	1 = Critical
NI = Needs Improvement	NA = Not applicable	2 = Major
		3 = Minor

The checklist is derived from the ISO 14001 standard, with each section of the standard being turned into a question.

Forty points are deducted for a critical nonconformance, 10 points for a major nonconformance and 1 point for a minor one.

This ISO 14001 assessor checklist is designed to **assess, not audit**, companies relative to the ISO 14001 standard. The results of this assessment compares your organization's current environmental management system relative to the standard and can help it understand, and commit to, an implementation plan which will assist in meeting ISO 14001 requirements within an agreed time frame.

Completing this assessor checklist alone is not enough. It should also result in a formal report to senior management.

An important aspect of your ISO 14001 assessment is communicating to customers and other stakeholders just where your organization stands relative to ISO 14001.

The scoring and ranking system which benchmarks your company on a scale of 0 to 100 points. A score of 100 points indicates that organization is ready to be audited by an ISO 14001 registrar.

Achieving ISO 14001 registration does not guarantee your organization will not be prosecuted or found guilty of an environmental offence.

However, the best way to minimize the risk of prosecution or conviction is to have a fully documented system and a demonstration that **all** procedures reasonably possible, within the circumstances, were taken to prevent environmental damage.

It demonstrates "due diligence". As a result all questions are extremely important, since all elements covered by the questions are inherent to a proper due diligence. The relative ratings, critical, major and minor are meant to suggest relative importance only.

5.1 The Scoring System

There are three parts to this ISO 14001 scoring system. They are:

- the assessment of your organization relative to each clause of the ISO 14001 standard, in terms of whether its systems or procedures are:

Measure	Symbol
• satisfactory,	S
• needs improvement,	NI
• unsatisfactory, or	US
• not applicable.	NA

- the identification of those clauses of the standard against which your organization needs to improve.
- whether a non-conformance to the standard is minor, major or critical.

Demerit points are assigned, as follows:

-1	for a minor non-conformance;
-10	for a major non-conformance; and
-40	for a critical non-conformance.

If a satisfactory measure **(S)** has been assigned, there is no demerit score.

When the unsatisfactory **(US)** measure is checked off for a particular criterion, the highest available demerit point must be assigned.

When the needs improvement **(NI)** measure is checked off, a major or minor demerit point is assigned, depending on how much improvement is needed, in the assessor's judgement.

These are informed judgments, based upon the objective evidence available.

However, if a **(US)** measure is assigned to the following checklist sections, a critical demerit score of -40 must be assigned because of the critical importance of that section to the success of your EMS system. Figure 9 identifies the sections in the standard that are considered critical.

Figure 9

Clause	The Clause is Critical if the Assessment Finds:
4.1 (1)	No environmental policy
4.1 (2)a	The environmental policy is not appropriate to the nature, scale and environmental impacts of its impacts, products or services.
4.1 (2)c	The environmental policy does not include a commitment to comply with relevant environmental legislation / regulations.
4. 3.1 (4)a	Top management has not appointed a specific management representative with responsibility to ensure that environmental management system requirements are established.
4.3.1 (1)	The organization has not identified specific significant environmental impacts.
4.4.7 (1)a	The organization does not have procedures of emergency preparedness and response.
4.6 (1)	Top management does not review the adequacy of the organization's environmental management system.

In summary, the measure, symbol and demerit points are as follows:

Measure	Symbol	Demerit Points
satisfactory	S	0
is not applicable	NA	0
needs improvement	NI	-1 Minor
needs improvement	NI	-10 Major
unsatisfactory	US	-10 Major
		-40 Critical

To rank your organization relative to the ISO 14001 standard, add the number of critical, major and minor non-conformances assigned to each clause of the standard.

Insert the number of critical, major and minor non-conformances in the appropriate box of the "Deficiency Rating" chart. The "Maximum Rating" refers to the maximum score possible in each section. The score of a hypothetical company is shown in the Figure 10.

Figure 10

Scoring Summary

4. Environmental Management System		Deficiency Rating			Maximum Rating		
		Critical	Major	Minor	Critical	Major	Minor
4.1	Environmental Policy	1	6	-	3	4	-
4.2	Planning	0	16	-	-	16	-
4.3	Implementation and Operation	0	20	20	3	23	17
4.4	Checking & Corrective Action	0	15	8	-	15	12
4.5	Management Review	0	5	1	1	5	-
	Totals	1	62	29	7	63	29

Then calculate the number of demerits your company has received, as shown in the example below.

Figure 11

Calculating the Demerit Points

					Demerits
	Number of Criticals	(#1)	1	x (-40) =	40
	Number of Majors	(#2)	62	x (-10) =	620
	Number of Minors	(#3)	29	x (-1) =	29
				Total Demerits	689

Finally, calculate your company's overall standing relative to the ISO 14001 standard using the following formula.

Total Demerits
(Numeric Score) $= 100 - \frac{(\text{Total Demerits} \times 100)}{939} = ?\ \%$

The hypothetical company shown in Figure 10 scored 26.6%, as follows:

Total Demerits
(Numeric Score) $= 100 - \frac{(689 \times 100)}{939} = 26.6\%$

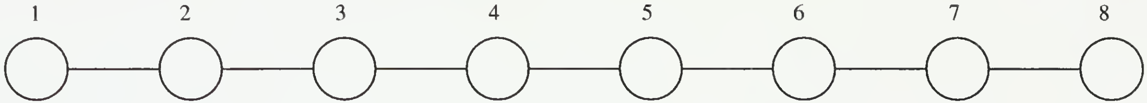
5.2 Recommended Steps for a Benchmark Assessment

Benchmarking an organization against the ISO 14001 standard involves examining the organization's environmental management system to evaluate whether it addresses all of the clauses of the standard.

Figure 12 outlines the recommended steps for a benchmark analysis.

Figure 12

Recommended Steps for a Benchmark Analysis



1. Meet President or CEO
   ¥ Review purpose of assessment
   ¥ Review statement of work

2. Meet with dept. heads for quality, environment, policy, audit, etc.
   ¥ short group meeting
   ¥ individual meetings

3. Office walk through
   ¥ follow regulatory process from beginning to end

4. Complete ISO 14001 Assessment

5. Identify opportunities for improvement in:
   ¥ management involvement
   ¥ employee and management training
   ¥ process flow charting
   ¥ data gathering and analysis
   ¥ quality system elements
   ¥ corrective action reports

6. Detailed report with:
   ¥ Benchmark and measurement against ISO 14001 standard
   ¥ percentage completed
   ¥ details of elements incomplete
   ¥ recommendations prioritized
   ¥ action plan with activities, responsibilities, timing, and milestones identified.

7. Review results with mgt. Ensure that managers understand the recommendations and that they agree and support the Action Plan.

8. Present completed report to President or CEO.

Five recommended enhancements to the ISO 14001 standard
¥ team building
¥ internal auditor training
¥ measurement
¥ customer communication
¥ leadership training

Part 6

Implementing ISO 14001

6.0 ISO 14001 Implementation

This section provides an overview of the steps that any company should take when implementing ISO 14001.

6.1 Key Elements of the Implementation Process

Based on the assessment / benchmark report, it is essential the implementation phase involve:

- top management commitment and participation in bringing your company up to the ISO 14001 standard;
- developing and getting commitment to the company's environmental policy and objectives;
- developing an implementation work plan based on the areas identified for improvement, including timelines;
- identifying team leaders and work groups to begin the implementation phase;
- developing:
  - process flow charts
  - standard operating procedures
  - work instructions
  - environmental targets at each level and function of the company's operations
  - appropriate environmental performance indicators
  - environmental monitoring and measuring procedures
- procedures for investigating, correcting and preventing non-conformances;
- emergency preparedness and response procedures;
- developing and implementing mechanisms to monitor and report implementation progress;
- developing employee implementation training and development programs;
- ensuring that quarterly interim progress assessments are objective;
- selecting a registrar and submitting required documentation or deciding whether to "self declare";
- conducting a pre-registration assessment to ensure registration readiness;
- becoming registered, if this is the route chosen.

Figure 13 is an example of a progress report, outlining a partial implementation work plan based on the findings of the assessment benchmark.

Figure 13

COMPANY NAME: ABC Company
PAGE: 1 of 1
REPORT DATE: July/1/96
1. IMPLEMENTATION PLAN: ISO 14001
2. CO-ORDINATOR:
3. GOALS: Registration by Nov. 1, '97
4. METHOD OF MEASUREMENT / VERIFICATION:

	DATE:	CRITICALS:	MAJORS:	MINORS:
FIRST AUDIT:	May 15, 1996			
SECOND AUDIT:	November 1, 1996			
THIRD AUDIT:	May 15, 1997			

5. DETAILED ACTIVITIES AND TIMETABLE FOR COMPLETION:
1.0 POLICY MANUAL BY: Nov. 1, 1996
2.0 PROCEDURAL MANUAL BY: Feb. 1, 1997
3.0 REGISTRATION AUDIT BY: Sept. 1, 1997

6. ASSIGNED RESPONSIBILITIES

			MONTH																		PERCENTAGE COMPLETE											
CHAMPION	ELEMENTS	ELEMENT DESCRIPTION	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	10	20	30	40	50	60	70	80	90	100	BRI	APP
	4.1	General Requirements																														
	4.2	Environmental Policy	▨	▨	▨	▨	▨	▨	▨	▨	▨										▨											
	4.3	Planning																														
	4.3.1	Environmental Aspects		▨	▨	▨															▨	▨	▨	▨	▨							
	4.3.2	Legal and Other Requirements		▨	▨																▨	▨	▨	▨	▨	▨	▨					
	4.3.3	Objectives and Targets	▨	▨	▨	▨	▨	▨													▨											
	4.3.4	Environmental Management Programme(s)	▨	▨	▨	▨	▨	▨													▨											
	4.4	Implementation and Operation																														
	4.4.1	Structure and Responsibility				▨	▨	▨	▨												▨	▨	▨	▨	▨	▨	▨					
	4.4.2	Training, Awareness and Competence						▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨									
	4.4.3	Communication											▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨							
	4.4.4	Environmental Management System Documentation				▨	▨	▨	▨	▨	▨	▨									▨											
	4.4.5	Document Control						▨	▨	▨	▨	▨									▨	▨										
	4.4.6	Operational Control							▨	▨	▨	▨	▨	▨							▨	▨	▨	▨	▨							
	4.4.7	Emergency Preparedness and Response		▨	▨																▨	▨	▨	▨	▨	▨	▨					
	4.5	Checking and Corrective Action																														
	4.5.1	Monitoring and Measurement													▨	▨	▨	▨			▨	▨	▨									
	4.5.2	Nonconformance, Corrective,Preventive Action														▨	▨	▨	▨		▨	▨	▨	▨								
	4.5.3	Records										▨	▨	▨	▨	▨	▨				▨	▨	▨									
	4.5.4	Environmental Management System Audit															▨	▨	▨	▨	▨											
	4.6	Management Review																▨	▨	▨												

START DATE: 11/1/96 TARGET COMPLETION DATE: September 1, 1997 ACTUAL COMPLETION DATE:

7. STATUS UPDATE: STARTING DATE OF ACTIVITY S ORIGINAL TARGET COMPLETION DATE: F REVISED TARGET COMPLETION DATE R

6.2 ISO 14001 Coordinator: Appointment and Role

Someone should be assigned responsibility within your company for the implementation of the ISO 14001 program (helped by a consultant if necessary). This ISO 14001 coordinator should:

- prepare a plan which prioritizes all activities related to the development and implementation of a system to comply with the requirements of ISO 14001;
- familiarize designated personnel with the standard and assist them to develop policies and procedures that are in compliance with requirements;
- assist in the development of environmental performance indicators and targets, as well as measurement and monitoring plans, which are compatible with existing processes and which involve process operators;
- assist in developing a formal environmental policy that communicates the corporate environmental mission to all employees, suppliers, customers, and other interested parties;
- work with management and staff to promote an understanding of the necessity for taking responsibility for maintaining the system that has been implemented;
- provide a system that permits the tracking of implementation progress against a schedule;
- report to management monthly and measure improvement in system functions against the initial benchmark assessment; and,
- develop a communication team with responsibility for defining the company's environmental objectives and communicating progress in implementing systems to meet and exceed them.

Your ISO 14001 coordinator, assisted by a consultant if you engage one, should provide the following implementation deliverables:

- a planned activities schedule and monthly progress report.
- a complete listing of the company's environmental policy and procedures;
- process flow charts and inspection and test plans involving process operators;
- a review of purchased supplies, identifying their environmental impacts, if any;

- assistance in the development of an environmental policy and mission statement;
- the formal appointment of the facility environmental representative;
- a complete data collection package;
- a management and workforce with capability to maintain the systems and continue the improvement process;
- guidance in the preparation of an environmental manual, including:
  - consolidation of current EMS processes;
  - organization and clarification of methods, systems and procedures in place, including activity, responsibility and authority of those involved; and
  - documentation of the above in accordance with ISO 14001.

6.3 Continual Improvement and Prevention of Pollution and Resource Conservation

ISO 14001 defines continual improvement as the "process of enhancing the environmental management system to achieve improvements in the overall environmental performance in line with the organization's environmental policy."

Prevention of Pollution and resource conservation is defined as the "use of processes, practices, materials or products that avoid, reduce or control pollution, which may include recycling, treatment, process changes, control mechanisms, efficient use of resources and material substitution."

The potential benefits of prevention of pollution and resource conservation include the reduction of adverse environmental impacts, improved efficiency and reduced costs.

To implement ISO 14001 properly, your environmental policy should include top management's commitment to continual improvement, prevention of pollution and resource conservation.

Some questions to consider when making the commitment to continual improvement include:

- what mechanisms does your company have to identify improvements?
- what methods will your company use to verify continual improvement?
- who will be given the responsibility for measuring continual improvement?
- what financial resources will be needed to verify continual improvement?
- what feedback loops will be established to communicate and implement improvement?

6.4 ISO 14001 Documentation Hierarchy

The ISO 14001 standard requires that an organization describe its environmental management system (EMS). While the standard does not require it, we recommend that an organization document its environmental policies, procedures and work instructions.

ISO 14001's documentation hierarchy usually comprises four parts or levels:

- the organization's overall environmental policy, as required by sub-clause 4.2 of the standard;
- policy statements related to each part of clause 4 of the standard;
- procedures - specifically management systems procedures - related to each part of clause 4 of the standard;
- work instructions that provide greater detail about the procedures;

An organization's documentation can be structured in either a 3- or a 2-tier format. Larger companies and those which have complex procedures and work instructions usually opt for a 3-tier documentation system. Most small to medium sized (SMEs) companies usually opt for a 2-tier system.

Figure 14 illustrates the relationship between the four documentation levels and the 3- and 2-tier documentation structures.

Figure 14

3 Tier EMS Documentation Structure	2-Tier EMS Documentation Structure
An Organization's Environmental Policy	An Organization's Environmental Policy
Policies - Tier 1	**Policies & Procedures - Tier 1**
1. Policy	1. Policy
2. Purpose	2. Purpose
3. Scope	3. Scope
4. Responsibility	4. Responsibility
5. Definitions	5. Definitions
6. References	6. Procedures
7. Attachments	7. References
	8. Attachments
Procedures - Tier 2	
1. Policy	
2. Purpose	
3. Scope	
4. Responsibility	
5. Procedures	
6. References	
7. Attachments	
Work Instructions - Tier 3	**Work Instructions - Tier 2**
1. Purpose	1. Purpose
2. Responsibility	2. Responsibility
3. Tools	3. Tools
4. Instructions	4. Instructions
5. References	5. References
6. Attachments	6. Attachments

Sample policy, procedure and work instructions are set out below for a 3-tier documentation system.

Sample Policy

Figure 15 is a sample policy for identifying environmental aspects. The format of this policy will be the same for all other policy statements required by ISO 14001.

Figure 15

ABC Ltd.	**Effective Date:** July 1, 1998	**Page** 1 of 1
Environmental System Manual	**Approved by:** President	**Revision:** 1
Section: 4.3.1 Environmental Aspects		

Policy

1. Policy	**ABC Ltd.** establishes and maintains procedures that identify the environmental aspects of its activities, products and services.
2. Purpose:	To control and influence those aspects which have or can have significant impacts on the environment and to ensure that aspects related to these significant impacts are considered in setting environmental objectives.
3. Scope:	Applicable to all incoming products, primary operations and supporting activities.
4. Responsibility:	The (name of position) is responsible for ensuring that this policy is understood, implemented and maintained.
5. Definitions:	Include here either specific definitions that may require explanation, or refer to an overall glossary for the system.
6. Procedure:	Identify the corresponding procedures for this policy which exist, if any.
7. References:	Identify other related documents and attach any forms, flow charts, checklists, diagrams, organizational charts that will assist the user in understanding or applying the policy.
8. Attachments:	Any forms related to the implementation of this procedure. You should identify by form #, revision level and / or date of revision and a description of what the form is.

Next Revision: July 1, 1999	
Prepared by: ISO 14001 Administrator	Date: June 30, 1998
Revision Schedule: Annual	Approved by: President

Sample Procedure

Figure 16 is a sample procedure for identifying environmental aspects. The format of this procedure will be the same for all other procedures required by ISO 14001.

Figure 16

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Environmental System Manual	**Approved by:** President	**Revision:** 1
Section: 4.3.1 Environmental Aspects		

Procedure

1. Purpose:	To identify all environmental aspects to determine those that have or could have a significant impact on the environment.
2. Scope:	This procedure is for all activities, products and services related to the (insert name of facility or description of site).
3. Responsibility:	The (name of position) is responsible for coordinating the process of determining environmental aspects throughout the organization and for preparing the final list.
4. Procedure:	1. The (name of position) will form a cross functional team, representing all parts of the organization. 2. The team will identify the organization's activities, products or services and the related environmental aspects and impacts. 3. The team will develop evaluation criteria required to evaluate the significance of each environmental aspect. 4. The team will assign a significance rating according to the evaluation criteria developed. 5. The (name of position) will document the analysis and evaluation. 6. The (name of position) will monitor changes to the organization's activities, products or services and identify when changes may have occurred to the organization's environmental aspects. The (name of position) will assemble the cross functional team as appropriate.
5. Definitions:	Include here either specific definitions that may require explanation, or refer to an overall glossary for the system.

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6. References:	4.3.3 Objectives and Targets
7. Attachments:	Aspects and Impacts Identification Form (F3.1.1)

Next Revision: July 1, 1999

Prepared by: ISO 14001 Administrator Date: June 30, 1998

Revision Schedule: Annual Approved by: President

Sample Work Instruction

Figure 17 is a sample work instruction for identifying environmental aspects. The format of this work instruction will be the same for all other work instructions required by ISO 14001.

Figure 17

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Environmental System Manual	**Approved by:** President		**Revision:** 1
Section: 4.3.1 Environmental Aspects			

Work Instruction

1. **Purpose:**	To identify all environmental aspects in to order to determine those that have or could have a significant impact on the environment.
2. **Responsibility:**	This work instruction is for all activities related to the (insert name of facility or description of site) and is based on a baseline assessment of its existing activities. It will be updated as changes occur to its activities.
3. **Tools:**	List any equipment that would be necessary to carry out the function of this element.
4. **Work Instruction:**	1. Assess each aspect for frequency of occurrence on a scale of 1 to 10. 2. Assess each aspect for the consequence on a scale of 1 to 10.
5. **References:**	4.3.3 Objectives and Targets
6. **Attachments:**	Environmental Significance Criteria (WI.1)

Next Revision: July 1, 1999		
Prepared by: ISO 14001 Administrator	Date :	June 30, 1998
Revision Schedule: Annual	Approved by:	President

6.5 ISO 14001 Order of Implementation

The recommended order of implementation of the clauses of ISO 14001 differs from the order in the standard and is as follows:

4.1	General Requirements
4.3.1	Environmental Aspects
4.2	Environmental Policy
4.3.2	Legal and Other Requirements
4.4.4	Environmental Management System Documentation
4.4.5	Document Control
4.3.3	Objectives and Targets
4.3.4	Environmental Management Program
4.4.1	Structure and Responsibility
4.4.6	Operational Control
4.5.1	Monitoring and Measurement
4.4.2	Training, Awareness and Competence
4.4.3	Communication
4.4.7	Emergency Preparedness and Response
4.5.2	Nonconformance and Corrective and Preventive Action
4.5.3	Records
4.5.4	Environmental Management System Audit
4.6	Management Review

The implementation clause by clause guide set out below follows this recommended order. Because 4.3.1 Environmental Aspects forms the foundation of the EMS system, it must be completed first as you must understand your environmental issues before you can develop a management system around them. The other clauses build upon the strength of the previous clause, and when developed in this order, form an effective and efficient ISO 14001 Environmental System.

6.5.1 General Requirements - Clause 4.1

Clause 4.1 asks whether:

> *the organization has established and maintained an environmental management system, the requirement of which are described in the whole of clause 4 of ISO 14001.*

In plain English, it asks whether the organization has fully implemented and maintained an environmental management system that meets the requirements of all 18 clauses (4.1 through 4.6) of ISO 14001.

At this stage the obvious answer is no. In fact, this requirement will not be fulfilled until all of the other clauses have been implemented. Nonetheless, it is the starting point.

Some Definitions from ISO

"Environment", for ISO 14001 purposes, refers to the surroundings in which an organization operates, extending from within the organization to the global system, and includes air, water, land, natural resources, flora, fauna, and humans.

An **"aspect"** refers to **an** element or part of an activity, product or service that interacts with or has some relation to the environment.

An **"activity"** refers to any major action taken or process engaged in by the company in the course of manufacturing a product or providing a service.

An **"impact"** refers to any change to the environment whether adverse or beneficial, wholly or partially resulting from an organization's activity, product or service.

6.5.2 Environmental Aspects and Impacts - Clause 4.3.1

Clause 4.3.1 is the key clause of the ISO 14001 standard and it asks whether:

> *the organization has established and maintains procedures to identify the environmental aspects of those activities, products, or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment.*

Moreover, the standard also asks the organization to ensure that the aspects related to these significant impacts are considered in setting environmental objectives and that the information is kept up-to-date.

In identifying aspects, one must consider activities, products and services, not just facility characteristics and operations. As well, aspects and impacts must be identified for normal, abnormal and emergency situations and kept up-to-date.

Environmental aspects do not necessarily entail changes to the environment, but may carry the potential for such. Figure 18 shows examples of activities, products and services, and their environmental aspects and impacts.

Figure 18

Activities	Aspects	Impacts
Combustion of fossil fuels	Air emissions, use of resources	Greenhouse gas, depletion of resources
Washing and lubricating processes	Control, treatment and/or release of waste effluent	Water pollution, potential for spills
Construction	Solid waste and noise	Use of landfill, reduction in quality of life
Packaging	Use of raw materials, solid waste	Use of landfill, depletion of resources, litter

Products	Aspects	Impacts
Recyclable package	Use of raw materials, potential for waste	Resource conservation, diversion of waste from landfill

Services	Aspects	Impacts
Vehicle maintenance	Exhaust emissions, use of fossil fuels, used parts	Reduced air pollution, increased energy efficiency, disposal of used auto parts
Delivery	Exhaust emissions, use of fossil fuels	Increased air pollution, depletion of resources

In identifying and evaluating the environmental aspects of the activities, products and services that it can control, a company should examine carefully the following elements of its operations:

- the nature and origin of the raw materials used in production or the provision of a service (is it a renewable or non-renewable resource?);
- the safe storage and handling of those materials, and the potential for accidental emissions and spills;
- the nature, requisites, and by-products of major production processes and activities (energy consumption; waste heat, water, effluent or solid waste; air emissions; contaminants or hazardous waste; noise);
- the nature, requisites, and by-products of the major activities or processes involved in the provision of a service (energy consumed; waste heat, water, or effluent; solid waste; emissions, hazardous waste, noise)
- the safe storage, handling and transportation of the final product (potential for accidental emissions and spills);
- the effects, or potential thereof, of the consumption or use of a product or service (packaging waste; post-consumer disposal)

Environmental aspects and impacts cover a broad range of "environmental" concerns, including:

- depletion of resources caused by non-renewable resource consumption, either for energy use or raw material. Ask such questions as:
  - is the use of alternative materials feasible?
  - have energy efficiencies been maximized?
  - what alternatives might be substituted to improve environmental performance?
- the hazards associated with the receipt, storage and handling of raw materials for employees, the public, flora and fauna, and soil, water and air quality. The risks and potential effects of accidental emissions and spills must be examined and identified. Ask such questions as:
  - how can such risks and effects be mitigated?
  - what is the feasibility of substituting volatile, toxic, or hazardous materials with more benign ones?

- the requisite energy requirements and waste by-products of a production process or service. Ask such questions as:
  - have energy efficiencies been maximized?
  - what are the aspects and impacts associated with production by-products, such as waste heat, water, effluent and other material, air emissions, and noise?
  - what are the effects of such wastes and by-products upon such things as landfill, soil, water, and air quality, local flora and fauna, employee and public health, and the quality of life for neighbouring populations as a result of noise or odour?
- the safe storage, handling and delivery of finished product. Ask such questions as:
  - what are the risks associated with the storage, handling and transportation of toxic or hazardous products for employee and public health, air, water, and soil quality, local flora and fauna, and neighbouring communities?
- the consumption or disposal of a company's product, or the use of a service, by the consumer. Ask such questions as:
  - are there by-products of consumption with environmental aspects or impacts, such as packaging waste, food containers, noise or odour?
  - does the product pose any environmental concerns from the standpoint of disposal, such as landfill use or environmentally problematic substances such as toxic chemicals or greenhouse gases?

Having identified the significant environmental aspects and impacts associated with its operations, the company must then develop and implement a program to manage and control aspects and impacts consistent with its commitment to the prevention of pollution.

Such a program may also include a process for identifying and evaluating substitute materials, sources, and processes that improve environmental performance and lessen negative environmental impacts or their potentiality. The evaluation of such will take place within the parameters of what is feasible in terms of the business of the company.

Companies should also identify those materials, activities, products, and services which contribute to the prevention of pollution and improve environmental performance, such as:

- the production or use of recycled / recyclable material;
- the adoption of energy-efficient technologies and processes;
- the diversion of production by-products such as steam, or heated air and water to generate energy or be used for other heating needs.
- the contribution of a product or service toward the reduction or prevention of pollution, such as cleaner technologies.

6.5.2.1 Flowcharting the Metal Finishing Process

A useful way to identify environmental aspects is to flowchart your company's primary and secondary processes.

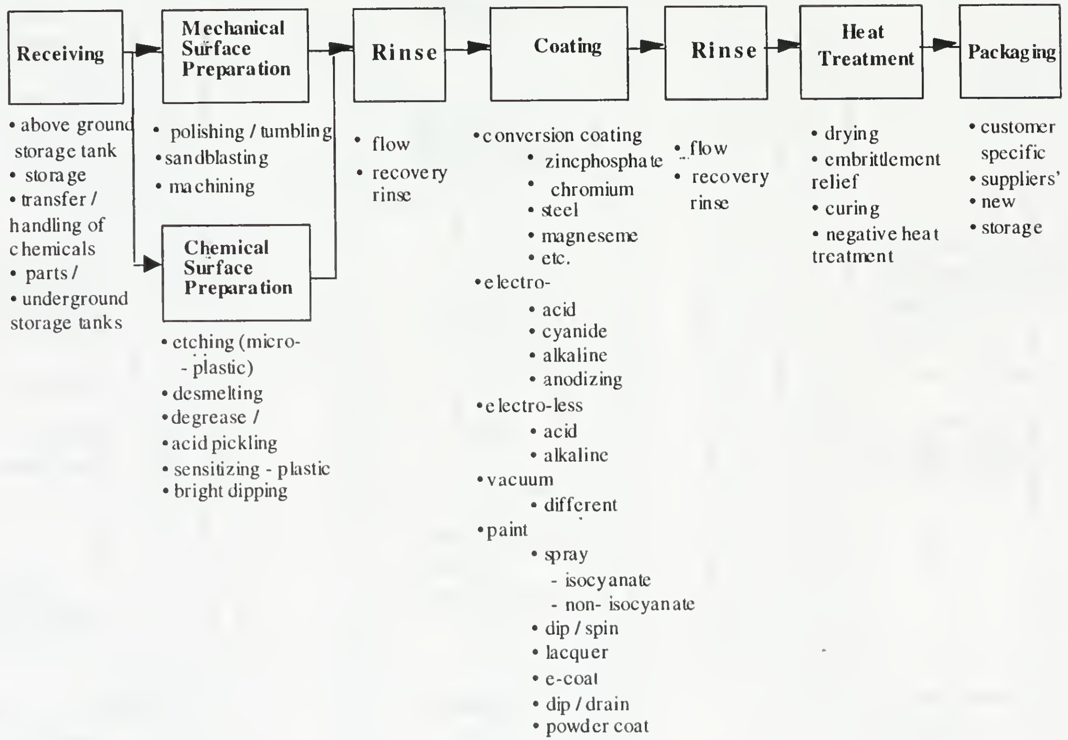
The process activities shown in Figures 19 and 20 are representative of the kinds of activities metal finishers perform.

However, some metal finishers will not undertake all activities. For example, some companies perform both chemical and mechanical surface preparation, while others only do chemical surface preparation.

If an activity is not relevant to your company, just skip to the next one that is.

Figure 19

Metal Finishing: Primary Process Activity Flow Chart



Again, not all metal finishers will do all of the activities illustrated in Figure 20. Just focus on those that are relevant to your organization.

Figure 20

Metal Finishing: Secondary Process Activity Flow Chart

Incoming Water Treatment

- deionization
- softening

Air Treatment

- dust collection
- srubbers
- vapour degreasers

Electrical Transformers

Wastewater Treatment

- collection pit
- hydroxide precipitation

Boiler

- natural gas

Transportation Fleet

- Vehicles
- Garage
- Fuelling Equipment & Storage

Rework

- finessing
- stripping

Plant / Facility Maintenance

- building
- grounds

Surface preparation, cleanliness, and proper chemical conditions are essential to ensuring that finishes perform properly. Without a properly cleaned surface, even the most expensive coatings will fail to adhere or prevent corrosion. Surface preparation techniques range from simple abrasive blasting to acid washes to complex, multi-stage chemical cleaning processes.

Various surface preparation methods are discussed below.

Some cleaning techniques involve the application of organic solvents to degrease the surface of the metal. Other techniques, emulsion cleaning, for example, use common organic solvents (e.g., kerosene, mineral oil, and glycols) dispersed in an aqueous medium with the aid of an emulsifying agent. Emulsion cleaning uses less chemical than solvent degreasing because the concentration of solvent is lower.

Alkaline cleaning may also be utilized for the removal of organic soils. Most alkaline cleaning solutions are comprised of three major types of components:

- builders, such as alkali hydroxides and carbonates, which make up the largest portion of the cleaner;
- organic or inorganic additives, which promote better cleaning or act to affect the metal surface in some way; and
- surfactants.

Alkaline cleaning is often assisted by mechanical action, ultrasonics, or by electrical potential (e.g., electrolytic cleaning).

Acid cleaning, or pickling, can also be used to prepare the surface of metal products by chemically removing oxides and scale from the surface of the metal. For instance, most carbon steel is pickled with sulfuric or hydrochloric acid, while stainless steel is pickled with hydrochloric or hydrofluoric acids, although hydrochloric acid may embrittle certain types of steel and is rarely used. The metal generally passes from the pickling bath through a series of rinses.

Acid pickling is similar to acid cleaning, but is usually used to remove the scale from semi-finished mill products, whereas acid cleaning is usually used for near-final preparation of metal surfaces before electroplating, painting, and other finishing processes.

Surface finishing usually involves a combination of metal deposition operations and numerous finishing operations.

Wastes typically generated during these operations are associated with the solvents and cleansers applied to the surface and the metal-ion-bearing aqueous solutions used in the plating tanks. For example:

- the cleaners (e.g., acids) may appear in process wastewater;
- the solvents may be emitted into the air, released in wastewater, or disposed of in solid form; and
- other wastes, including paints, metal-bearing sludges, and still bottom wastes, may be generated in solid form.

Metal-ion-bearing solutions are commonly based on hexavalent chrome, trivalent chrome, copper, gold, silver, cadmium, zinc, and nickel. Many other metals and alloys are also used, although less frequently.

Several of the many metal finishing operations are described below.

1. Anodizing

Anodizing is an electrolytic process that converts the metal surface to an insoluble oxide coating. Anodized coatings provide corrosion protection, decorative surfaces, a base for painting and other coating processes, and special electrical and mechanical properties. Aluminum is the most frequently anodized material. Common aluminum anodizing processes include:

- chromic acid anodizing,
- sulfuric acid anodizing, and
- boric-sulfuric anodizing.

The sulfuric acid process is the most common method.

Following anodizing, parts are typically rinsed, then proceed through a sealing operation that improves the corrosion resistance of the coating. Common sealants include:

- chromic acid,
- nickel acetate,
- nickel-cobalt acetate, and
- hot water.

2. Chemical Conversion Coating

Chemical conversion coating includes:

- chromating,
- phosphating,
- metal coloring, and
- passivating operations.

Chromate conversion coatings are produced on various metals by chemical or electrochemical treatment. Solutions, usually containing hexavalent chromium and other compounds, react with the metal surface to form a layer containing a complex mixture of compounds consisting of chromium, other constituents, and base metal.

Phosphate coatings may be formed by the immersion of steel, iron, or zinc-plated steel in a dilute solution of phosphate salts, phosphoric acid, and other reagents to condition the surfaces for further processing. They are used to:

- provide a good base for paints and other organic coatings;
- condition the surfaces for cold forming operations by ;
- providing a base for drawing;
- compounds and lubricants; and
- impart corrosion resistance to the metal surface.

Metal colouring involves chemically converting the metal surface into an oxide or similar metallic compound to produce a decorative finish such as a green or blue patina on copper or steel, respectively. Passivating is the process of forming a protective film on metals by immersion into an acid solution, usually nitric acid or nitric acid with sodium dichromate. Stainless steel products are often passivated to prevent corrosion and extend the life of the product.

3. Electroplating

Electroplating is the production of a surface coating of one metal upon another by electrodeposition. Electroplating activities involve applying predominantly inorganic coatings onto surfaces to provide corrosion resistance, hardness, wear resistance, anti-frictional characteristics, electrical or thermal conductivity, or decoration. The most commonly electroplated metals and alloys include:

- brass (copper-zinc)
- cadmium
- chromium
- copper
- gold
- nickel
- silver
- tin
- zinc.

In electroplating, metal ions in either acid, alkaline, or neutral solutions are reduced on the workpieces being plated. The metal ions in the solution are usually replenished by the dissolution of metal from solid metal anodes fabricated of the same metal being plated, or by direct replenishment of the solution with metal salts or oxides.

Cyanide, normally in the form of sodium or potassium cyanide, is usually used as a complexing agent for cadmium and precious metals electroplating, and to a lesser degree, for other solutions such as copper and zinc baths.

The sequence of steps in an electroplating includes:

- cleaning, often using alkaline and acid solutions;
- stripping of old plating or paint;
- electroplating; and
- rinsing between and after each of these operations.

Sealing and conversion coating may be employed on the metals after electroplating operations.

4. Electroless Plating

Electroless plating is the chemical deposition of a metal coating onto a plastic object, by immersion of the object in a plating solution. Copper and nickel electroless plating is commonly used for printed circuit boards. The basic ingredients in an electroless plating solution are:

- a source of metal (usually a salt);
- a reducer;
- a complexing agent to hold the metal in solution; and
- various buffers and other chemicals designed to maintain bath stability and increase bath life.

Immersion plating produces a thin metal deposit, commonly zinc or silver, by chemical displacement. Immersion plating baths are usually formulations of metal salts, alkalis, and complexing agents (e.g., lactic, glycolic, malic acid salts). Electroless plating and immersion plating commonly generate more waste than other plating techniques, but individual facilities vary significantly in efficiency.

5. Painting

Painting involves the application of predominantly organic coatings to a workpiece for protective and/or decorative purposes. It is applied in various forms, including dry powder, solvent-diluted formulations, and water-borne formulations. Various methods of application are used, the most common being spray painting and electrodeposition.

Spray painting is a process by which paint is placed into a pressurized cup or pot and is atomized into a spray pattern when it is released from the vessel and forced through an orifice. Electrodeposition is the process of coating a workpiece by either making it anodic or cathodic in a bath that is generally an aqueous emulsion of the coating material.

When applying the paint as a dry powder, some form of heating or baking is necessary to ensure that the powder adheres to the metal. These processes may result in solvent waste (and associated still bottom wastes generated during solvent distillation), paint sludge wastes, paint-bearing wastewaters, and paint solvent emissions.

6. Other Metal Finishing Techniques

Polishing, hot dip coating, and etching are processes that are also used to finish metal. Polishing is an abrading operation used to remove or smooth out surface defects (scratches, pits, or tool marks) that adversely affect the appearance or function of a part.

Following polishing operations, area cleaning and washdown can produce metal-bearing wastewaters.

Hot dip coating is the coating of a metallic workpiece with another metal to provide a protective film by immersion into a molten bath.

Galvanizing (hot dip zinc) is a common form of hot dip coating. Water is used for rinses following precleaning and sometimes for quenching after coating. Wastewaters generated by these operations often contain metals. Etching produces specific designs or surface appearances on parts by controlled dissolution with chemical reagents or etchants.

Etching solutions commonly comprise strong acids or bases with spent etchants containing high concentrations of spent metal. The solutions include:

- ferric chloride
- nitric acid
- ammonium persulfate
- chromic acid
- cupric chloride, and
- hydrochloric acid.

Figure 21 summarizes some of the process, material inputs, air emissions, process waste water and solid waste outputs related to metal finishing.

Figure 21

Metal Finishing - Process Material Inputs and Outputs

Process	Material Input	Air Emissions	Process Waste Water	Solid Waste
Surface Preparation Solvent degreasing & emulsion alkaline, and acid cleaning	Solvents, emulsifying, agents, alkalis, and acids	Solvent, (associated with solvent degreasing & emulsion cleaning only	Solvents, alkaline & acid wastes	Ignitable wastes, solvent wastes and still bottoms
Surface Finishing Anodizing	Acids	Metal -ion - bearing mists and acid mists	Acid waste	Spent solutions, wastewater treatment sludges, and base metals
Chemical Conversion Coating	Metal & Acids	Metal -ion - bearing mists and acid mists	Metal salts, acid and base wastes	Spent solutions, wastewater treatment sludges, and base metals
Electroplating	Acid / Alkaline solutions, heavy metal bearing solutions and cyanide bearing solutions	Metal -ion - bearing mists and acid mists	Acid / alkaline cyanide & metal wastes	Metal & reactive wastes
Plating	Metals (e.g., salts) complexing agents & alkalis	Metal -ion - bearing mists and acid mists	Cyanide & metal wastes	Cyanide & metal wastes
Painting	Solvents & paints	Solvents	Solvent wastes	Still bottoms, sludges, paint solvent & metal
Other Metal Finishing Techniques (including Polishing, hot dip coating and etching)	Metals & acids	Metal fumes & acid fumes	Metal & acid wastes	Polishing sludges, hot dip tank dross, & etching sludges

6.5.2.2 Aspects and Impacts Worksheets

The Worksheets shown in Figures 22, 23, 24, 25, 26 and 27 are designed to help metal finishers identify environmental aspects and impacts in the following activities:

- zinc phosphate;
- cyanide copper plating;
- anodizing;
- degreasing;
- waste water treatment;
- receiving.

The ISO 14001 standard speaks of "significant impacts on the environment" and involves the following “concerns”.

Environmental concerns:

- scale
- severity
- probability of occurrence
- duration of impact

Business concerns:

- potential regulatory and legal exposure
- difficulty of changing the impact
- cost of changing the impact
- effect of change on other activities and processes
- concerns of interested parties, and
- the effect on the public image of the organization.

The key is to be consistent and to keep it simple.

Figure 22

Zinc Phosphate Environmental Aspects & Impacts Identification Form

Assigned To: ....

Date Completed: ....

Team Members: ....

	Inputs	Process / Activity	Aspects			Impacts
			Normal	Start up / Shutdown	Unplanned / Emergency	
1.	Zinc Phosphate	**Z**			Leak / spill	Landfill
		I	Drag-out waste			Water treatment
		N		Tank clean out		Sludge to landfill
2.	Water	**C**			Overflow	Overload water treatment
3.	Steam Heat	**P**	Use of natural gas	Increased use		Depletion of resources
		H	Air emissions			Air pollution
		O	Thermal emissions			Air pollution
4.	Electricity	**S**	Use of electricity			Depletion of resources
		P				
		H				
5.	Steel	**A**	Scrap metal			Landfill or recycling
6.	Rinse Water	**T**	Water use		Leak / spill	Water treatment, landfill
7.	Skimmers/ Filters	**E**	Recirculation			Water conservation

Figure 23

Cyanide Copper Plating Environmental Aspects & Impacts Identification Form

Assigned To: .... Date Completed: ....

Team Members: ....

	Inputs	Process/ Activity	Normal	Aspects Start up / Shutdown	Unplanned / Emergency	Impacts
1.	Copper Metal		Drag-out waste			Landfill
	Copper Cyanide	**Cyanide**	Dust / minor spill		Leak / spill with acid	Landfill
						Cyanide gas
2.	Sodium Cyanide	**Copper**	Dust / minor spill			Landfill
						Cyanide gas
	Sodium Hydroxide	**Plating**	Dust / minor spill		Leak / spill with acid	
	Sodium Carbonate		Dust / minor spill			
3.	Water		Dragout rinse			Water treatment
				Water overflow		Water treatment or contamination
4.	Low Air Pressure		Air exhaust	Increase exhaust		
			Stack emissions	Increase emissions		
				Noise		
			Natural gas		Explosion	Depletion of non-renewable resources
5.	Electricity		Use of resources			Depletion of non-renewable resources

Figure 24

Anodizing Environmental Aspects & Impacts Identification Form

Assigned To: .... Date Completed: ....

Team Members: ....

	Inputs	Process/ Activity	Aspects			Impacts
			Normal	Start up / Shutdown	Unplanned / Emergency	
1.	Sulphuric Acid	A N	Acid mists, air emissions			Air pollution
		O			Spill	Water treatment
2.	De ionized Water	D	Wastewater			Water treatment
		I			Spill	Water treatment, Solid waste
3.	Electricity	I	Use of resources			Depletion of resources
4.	Dyes, sealers	Z	Wastewater	Waste liquid		Water treatment
		I	Mists			
5.	Chromic hydrophoric	N	VOC emissions			Air pollution
6.	Masking agents	G	VOC emissions			Air pollution

Figure 25

Degreasing Environmental Aspects & Impacts Identification Form

Assigned To: .... Date Completed: ....

Team Members: ....

	Impacts	Process / Activity	Aspects			Impacts
			Normal	Start up / Shutdown	Unplanned / Emergency	
1.	Steam / Water	D	Wastewater		Steam, wastewater	On-site water treatment / water contamination
		E	Water evaporation			
2.	Cleaning Chemicals - dry	G	Dust			Air contamination
	e.g. caustics, surfactants	R			Spill	Air contamination, landfill
3.	Cleaning Chemicals - dry	E	Minor spill	Leak / spill		Water treatment or landfill
	e.g. solvents, acids	A			Major leak / spill	Water contamination, landfill
4.	Heat	S	Use of natural gas	Increased use of natural gas		Depletion of a nonrenewable resource
		I	Thermal emission	Thermal emission		Air pollution
		N			Nat. Gas leak/ explosion	Air pollution, Depletion of nonrenewable resources
5.	Metal e.g. brass, zinc, steel	G	Wastewater - metals			Water treatment
			Wastewater - grease			Water treatment
					Leak / spill	Waste contamination or landfill

Figure 26

Waste-Water Environmental Aspects & Impacts Identification Form

Assigned To: ....

Date Completed: ....

Team Members: ....

	Inputs	**Process/ Activity**		**Aspects**		**Impacts**
			Normal	**Start / Shutdown**	**Unplanned / Emergency**	
1.	Rinse wastewater		Heavy metal sludge			Landfill
	e.g. solvents, acids, grease		Air emissions (VOC)			Air pollution - smog
		WATER WASTE				Depletion of natural resources
2.	Process wastewater	**-**				
	e.g. metal salts, acids, cyanide wastes	**TREAT-MENT**			Spills	Water contamination, soil contamination
3.	Water Treatment Chemicals				Spill	Water contamination
4.	Filters, filter substances					
5.	Energy		Use of natural resource			Depletion of natural resources
6.	Air					

Figure 27

Receiving Environmental Aspects & Impacts Identification Form

Assigned To: .... Date Completed: ....

Team Members: ....

	Inputs	Process/ Activity		Aspects		Impacts
			Normal	Start / Shutdown	Unplanned / Emergency	
1.	Bulk chemicals (tanker)	R	Vapours			Air contamination
		E			Minor spills	Landfill, water contamination
		C			Major spill	Landfill, water contamination
		E			Fire / explosion	Air pollution, hazardous potential
2.	Chemicals - dry	I			Spill	Solid waste, air contamination
	Bags, boxes, etc.	V	Dust			Air contamination
3.	Chemicals - liquid	I			Minor spill	Solid waste OR water contamination
	Drums, carboys,	N				
		G	Recycled packaging			
5.	Parts / Material					

6.5.2.3 Determining Significance

Clause 4.3.1 – Environmental Aspects - requires an organization to establish and maintain procedures that identify the environmental aspects of its activities, products or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment. The organization shall ensure that the aspects related to these significant impacts are considered in setting its environmental objectives.

The purpose of determining significance is to ensure a company is focussing on “first things first”.

"Significant impacts on the environment" involve:

Environmental concerns:

- scale;
- severity;
- probability of occurrence;
- duration of impact.

Business concerns:

- potential regulatory and legal exposure;
- difficulty of changing the impact;
- cost of changing the impact;
- effect of change on other activities and processes;
- concerns of interested parties; and
- the effect on the public image of the organization.

ISO 14001 requires an organization to identify those aspects that have or can have significant impacts on the environment.

As used in ISO 14001, significance is a relative term. There is no absolute measure whereby "x" parts per million or "y" kilograms per year is deemed as being significant.

In evaluating significance, the following methodology is used.

Using the formula: r = f x c

where:

r = risk;

f = frequency (likelihood of impact occurring); and

c = consequence (severity of impact)

Frequency can be determined either by "how often" or "how likely" an environmental aspect is expected to occur, as illustrated in Figure 28.

Figure 28

Ranking	Frequency (Likelihood)
1 to 3	rare / high unlikely
4 to 6	occasionally / possible
7 to 10	frequent / likely

Determining **consequence** can be much more complex depending on the impact itself. If the impact is not complex or too numerous, it is possible to assign a value directly, as illustrated in Figure 29.

Figure 29

Ranking	Consequence (Severity)
1 to 3	Mild
4 to 6	Moderate
7 to 10	serious, catastrophic or fatal

More Detailed Approach

If the above evaluation does not adequately address the complexity of your impacts, then consider using the sub-criteria described below. This more detailed approach is takes "consequence" and breaks it down into sub-criteria, as listed below. By assigning each of these sub-criteria values and calculating an overall consequence value at this level, the organization is able to more accurately determine the consequences of its environmental impacts.

Sub Criteria	Low	Medium	High
Hazard (hazardous nature of material)			
Scale (on-site, immediate off-site, extensive off-site / number of people affected)			
Duration (reversibility)			
Volume (concentration)			
Public Perception			
Overall Value			

6.5.2.4 Summary of Environmental Aspects, Impacts and Significance

Figure 30 is a worksheet that can be used to summarize the organization's activities, aspects, impacts and significance.

Figure 30

Schedule 4.3.1(a)
Summary of Environmental Aspects and Impacts

Activity	Aspect	Impact	Significance Rating
Degreasing	waste water	water contamination	4
	water evaporation	None	0
	dust	air contamination	2
	thermal emissions	air pollution	1
Anodizing	acid mist	air pollution	8
	waste water	effluent for water treatment	6

6.5.3 Environmental Policy - Clause 4.2

Clause 4.2 asks whether:

top management has defined the organization's environmental policy and ensures that its policy:

- *is appropriate to the nature, scale and environmental impacts of the company's activities, products or services;*
- *includes a commitment to continual improvement and prevention of pollution;*
- *includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes;*
- *provides the framework for setting and reviewing environmental objectives and targets;*
- *is documented, implemented and maintained and communicated to all employees; and,*
- *is available to the public.*

Figure 31 is a sample environmental policy that may or may not contain the organization's formal mission and vision statement. See Figure 14 for where this policy "fits" in a company's EMS documentation.

Figure 31

Environmental Policy

ABC Metal Finishing Ltd. is committed to minimizing adverse environmental impacts. It recognizes its role in environmental protection and is committed to practices that:

- comply with relevant environmental legislation and regulations;
- produce metal finishing products that employ a pollution prevention approach to their design and production processes;
- ensure proper handling of materials and responsible waste management;
- set objectives and targets that measure performance;
- provide information to the public on the company's environmental activities.

It is committed to the continual improvement of its environmental management system.

The environmental policy should be consistent with other policies and take into account requirements imposed by other stakeholders, e.g., customers, regulatory agencies, trade associations, and the general community.

6.5.4 Legal and Other Requirements- Clause 4.3.2

Clause 4.3.2 asks whether:
the organization has established and maintained a procedure to identify and have access to legal and other requirements to which the organization subscribes, that are applicable to the environmental aspects of its activities, products or services.

In other words, are you aware of all of the laws, regulations, by-laws and other commitments your company has made regarding its activities, products or services and could you readily retrieve a copy of these laws?

Figure 32 is a sample of the federal legislation and regulations that apply to metal finishing companies as at July 1998. This list is not necessarily complete. It is important that each company ensures that it is in compliance or has a plan to be in compliance with all legislative and regulatory requirements.

Figure 32

Sample Federal Legislation and Regulations

Aspect	Federal Legislation	Objective
Air Emissions	Ozone Depleting Substances Regulations (SOR / 95 - 576)	Controls the import, manufacture, use, sale and export of ozone depleting substances
	Ozone Depleting Products Regulations (SOR / 95 – 576)	Controls the manufacture, use, sale and export of products made with or containing ozone depleting substances
	Ozone Depleting Substances Regulations No 4 (SOR / 93 - 214)	specific controls on material containing tetrachloromethane or 1,1,1 - trichloroethane (methyl chloroform)
	Canadian Environmental Protection Act R.S.C 1985,c. 16 (4th Supp.)	Regulates release of toxic substances including PCB, CFC, lead, asbestos and mercury
Transportation	Transportation of Dangerous Goods Act S.C. 1992, c.34	Movement of dangerous goods, including prescribing safety marks, shipping documents, warning labels and placards and procedures re spills and emergency preparedness
Hazardous Waste	Storage of PCB Materials Regulation (SOR/92-507)	Storage and handling of PCB wastes

Figure 33 is a sample of Ontario legislation and regulations that apply to metal finishing companies. This list is not necessarily complete.

Figure 33

Sample Ontario Legislation and Regulations

Aspect	Ontario Legislation	Objective
Air Emissions	Environmental Protection Act, Sec. 9	Air Certificates of Approval needed for all new or modified air emissions sources
	General - Air Pollution Regulation R.R.O. 1990, Reg. 346	Maximum air containment concentrations at off-site receptors
	Boilers Reg. R.R.O. 1990, Reg. 338	Fuel oil or coal with sulphur content over 1% prohibited in new or modified boilers
	Ambient Air Quality R.R.O. 1990, Reg. 337	Sets maximum ambient air quality criteria for pollutants
	Ozone Depleting Substances – General (R.R. O. 1990, Reg. 356)	Prohibits the use of specified ozone depleting substances
	Halon Fire Extinguishing Equipment (O. Reg. 413/94)	Prohibits certain Halons discharges
	Environmental Protection Act (1990) Chapter E 19	Legislation covers Certificates of Approval, spill response, prevention of adverse effects
Hazardous Waste	General Waste Management Regulations R.R.O. 1990 347	Handling and moving of hazardous waste
	Waste Management - PCBs Reg. 362	Management and out of service PCB waste and equipment
Waste Generation	Waste Audits and Waste Reduction Workplace Regulation O. Reg. 102/94)	Major industrial, commercial and institutional waste generators required to conduct waste audits and reduction plans
Waste Water	Ontario Water Resources Act R.S.O. 1990, c.0.40	Water with any polluting material prohibited if it might impair water quality
	O. Reg. 360	Spills

Figure 34 is a sample of municipal by-laws that apply to metal finishing companies. This list is not necessarily complete.

Figure 34

Sample Municipal By-Laws

Aspect	Municipal By-Laws	Objective
Noise	Noise By-Law	Regulates noise
Waste Water	Toronto Sewer Use By-Law 1992-117	Regulates discharges into sanitary, combined and storm sewers

6.5.5 Environmental Management System Documentation - Clause 4.4.4

Clause 4.4.4 asks whether:
the organization has established and maintained information, in paper or electronic form, to:

- *describe the core elements of the management system and their interaction;*
- *provide direction to related documentation.*

In essence, an organization should keep and manage on an on-going basis such records as:

- legislative and regulatory requirements;
- permits;
- environmental aspects and their associated impacts;
- environmental training activity;
- inspection, calibration and maintenance activity;
- monitoring data;
- details of non-conformance: incidents, complaints and follow-up action;
- product identification; composition and property data;
- supplier and contractor information; and,
- environmental audits and management reviews.

6.5.6 Document Control- Clause 4.4.5

Clause 4.4.5 asks whether:
the organization has established and maintained procedures for controlling all documents required by ISO 14001 to ensure that:

- *they can be located;*
- *they are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel;*
- *current versions of relevant documents are available at all locations to ensure effective functioning of the EMS;*
- *obsolete documents are promptly removed;*
- *any obsolete documents retained are suitably identified.*

The purpose of document control is to ensure that the correct version, or revision, of a document is available to the user and, that the user can correctly identify the document and confirm that it is the correct version.

A "document" differs from a "record" in that it can be changed - a "record" cannot be changed. A document is any written information (electronic or paper) that is used in performing or guiding an action or decision related to environmental management.

Both internal and external documents need to be controlled and include:
- policies, procedures and work instructions;
- technical or equipment manuals;
- plans, forms, checklists;
- standards and guides;
- reports and drawings;
- specifications, data sheets.

Internal documents should be controlled from creation or revision through to approval for use and, finally, disposition. Figure 35 illustrates the kind of information that should show, as a header or footer, on each page of a document.

Figure 35

ABC Ltd.		**Effective Date:** July 1, 1998	**Page** 1 of 1
Environmental System Manual	**Approved by:** President		**Revision:** 1
Section: 4.3.1 Environmental Aspects			

External documents are created, approved and changed outside the jurisdiction of the organization. Even so, responsibility should be assigned for receiving, issuing internally, retrieving and destroying obsolete copies of external documents. Most external documents are identified uniquely so no additional naming or numbering is usually required.

6.5.7 Objectives and Targets - Clause 4.3.3

Clause 4.3.3 asks whether:

the organization has established and maintained documented environmental objectives and targets, at each relevant function and level within the organization and has considered:

- *the legal and other requirements;*
- *its significant environmental aspects;*
- *its technological options;*
- *its financial, operational and business requirements; and the,*
- *views of interested parties.*

The objectives and targets shall be consistent with the environmental policy, including commitment to prevention of pollution.

In essence, the organization is required to set objectives that will enable it to meet its environmental policy. These objectives are the overall goals for environmental performance identified in the environmental policy.

Environmental targets are then set to achieve these objectives within a specified time frame. The target should be specific and measurable.

Figure 36 shows examples of objectives and targets. See also Section 5 for more detail.

Figure 36

Sample Objectives and Targets

Objectives	Targets
Reduce waste and depletion of resources	10% reduction in energy or raw material in 1998 per unit of production
Reduce or eliminate the release of pollutants	50% reduction in CO2 emissions in 5 years

6.5.8 Environmental Management Program - Clause 4.3.4

Clause 4.3.4 asks whether:

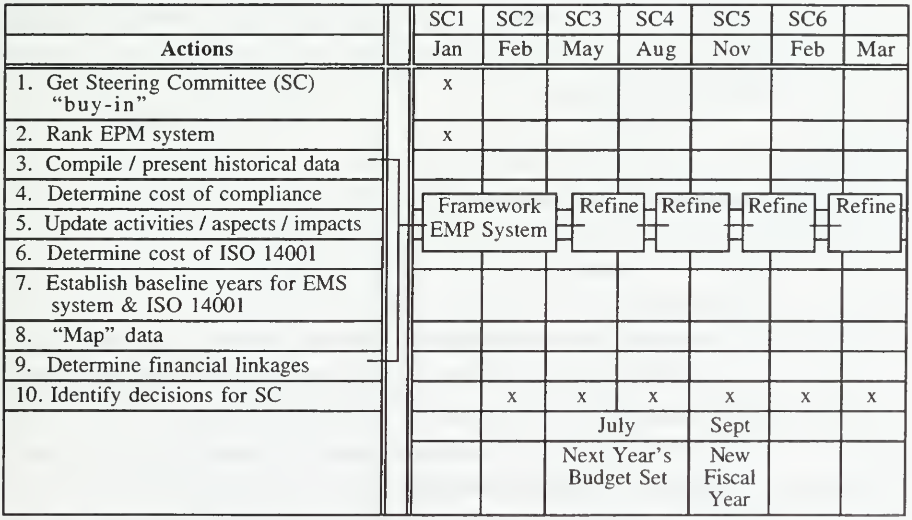
the organization has established and maintained a program for achieving its objectives and targets, including:

- *designation of responsibility for achieving objectives and targets at each relevant function and level of the organization;*
- *the means and time frame by which they are to be achieved.*

To be effective, an organization's environmental planning should be integrated into its strategic plan and annual budget and should address schedules and responsibilities for achieving its objectives and targets. Figure 37 illustrates the integration into the budgeting process.

Figure 37

Integration of Environmental Planning with the Annual Budget



	SC1	SC2	SC3	SC4	SC5	SC6	
Actions	Jan	Feb	May	Aug	Nov	Feb	Mar
1. Get Steering Committee (SC) "buy-in"	x						
2. Rank EPM system	x						
3. Compile / present historical data							
4. Determine cost of compliance	Framework EMP System		Refine	Refine		Refine	Refine
5. Update activities / aspects / impacts							
6. Determine cost of ISO 14001							
7. Establish baseline years for EMS system & ISO 14001							
8. "Map" data							
9. Determine financial linkages							
10. Identify decisions for SC		x	x	x	x	x	x
			July		Sept		
			Next Year's Budget Set		New Fiscal Year		

6.5.9 Structure and Responsibility - Clause 4.4.1

Clause 4.4.1 asks whether:

the organization has:

- *defined, documented and communicated roles, responsibilities and authorities in order to facilitate effective environmental management.*
- *provided the resources essential to implement and control the EMS system, including human resources and specialized skills, technology and financial resources.*
- *appointed specific management representative(s) who, irrespective of other responsibilities, have defined roles, responsibilities and authority for:*
  - *ensuring the EMS system requirements are established, implemented and maintained;*
  - *reporting on the performance of the EMS system to top management for review and improvement.*

Job descriptions are not required by the ISO 14001 standard, but up-to-date job descriptions are an effective way to define roles, responsibilities and authorities. Where possible, avoid duplicating in a job description information that is included in your EMS documentation.

6.5.10 Operational Control - Clause 4.4.6

Clause 4.4.6 asks whether:

the organization has:

- *identified those operations and activities that are associated with the identified significant environmental aspects in line with its policy, objectives and targets;*
- *planned its activities, including maintenance, to ensure that they are carried out under specified conditions by:*
  - *establishing and maintaining documented procedures to cover situations where there absence could lead to deviations from the environmental policy and objectives and targets;*
  - *stipulating operating criteria in the procedures;*

- *establishing and maintaining procedures related to the identifiable significant environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors.*

Implementation of ISO 14001 is accomplished through the establishment and maintenance of operational procedures and controls to ensure the organization's environmental policy, objectives and targets can be met.

A documented procedure may or may not be required (see page 48, figure 16 for details on procedures).

Some customers, e.g., Quebec Hydro, are now interpreting Clause 4.4.6, specifically the reference to suppliers and subcontractors, to mean that Quebec Hydro's suppliers and subcontractors may well need to have a compatible EMS system in place in order for Quebec Hydro to meet its own ISO 14001 requirements.

6.5.11 Monitoring and Measurement - Clause 4.5.1

Clause 4.5.1 asks whether:
the organization has:

- *established and maintained documented procedures to monitor and measure, a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment, including:*
  - *recording information to track performance;*
  - *relevant operational controls; and*
  - *conformance with the organization's environmental objectives and targets.*
- *calibrated and maintained monitoring equipment and retained records according to its procedures;*
- *established and maintained procedures for periodically evaluating compliance with relevant environmental legislation and regulations.*

This means that you must regularly monitor and measure appropriate criteria or indicators relating to the identified significant impacts, environmental performance, and objectives and targets. Documented procedures are required for these monitoring and measurement activities (see page 48, figure 16 for details on writing a procedure).

When identifying the potential environmental aspect to be monitored keep in mind the standard refers to "key characteristics" of the organization's operations and activities. Therefore, focus on critical parameters of your facility and on the objectives and targets that you have established.

6.5.12 Training, Awareness and Competence - Clause 4.4.2

Clause 4.4.2 asks whether:
the organization has:

- *identified its training needs;*
- *required that all personnel whose work may create a significant impact upon the environment have received appropriate training;*
- *established and maintained procedures to make its employees at each relevant function and level aware of:*
    - *the importance of conformance with the environmental policy and procedures and with the requirements of the EMS system;*
    - *the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;*
    - *their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the EMS system, including emergency preparedness and response requirements;*
    - *the potential consequences of departure from specified operating procedures.*
    - *competent personnel (i.e., appropriate education, training and / or experience) performing tasks which can cause significant environmental impacts .*

ISO 14001 requires that all employees understand the importance of acting in accordance with the organization's environmental policy and the overall requirements of the EMS system.

To achieve this, employees must understand their EMS roles and responsibilities, including the organization's emergency response procedures.

The standard requires that training include awareness of the potential or actual significant impacts associated with doing tasks and the consequences of not following operating procedures.

Figure 38 is a worksheet that identifies the organization's training requirements.

Figure 38

Training Requirements			
Aspect	**Legislative Requirement**	**Objective of Legislation**	**Training**
Transportation	Transportation of Dangerous Goods Act S.C. 1992, c.34	Movement of dangerous goods, including prescribing safety marks, shipping documents, warning labels and placards and procedures re spills and emergency preparedness	handling, storage, incidence response
Hazardous Waste	Storage of PCB Materials Regulation (SOR/92-507)	Storage and handling of PCB wastes	handling, storage, incidence response

6.5.13 Communication - Clause 4.4.3

Clause 4.4.3 asks whether in relation to its environmental aspects and environmental management system:
the organization has:

- *established and maintained procedures for:*
  - *internal communication between the various levels and functions of the organization;*
  - *receiving, documenting and responding to relevant communication from external interested parties.*
- *considered processes for external communication on its significant environmental aspects and recorded its decision.*

This requirement means that your organization must have formal, **internal and external,** procedures in place for communicating environmental management information in order to:

- demonstrate management's commitment to the environment;
- deal with concerns and questions about the environmental aspects of the organization's activities, products or services;
- raise awareness of the organization's environmental policies, objectives, targets and programs;
- inform internal or external interested parties about the organization's environmental management system and performance as appropriate.

Results from EMS monitoring, audit and management review should be communicated to those within the organization responsible for performance.

The provision of information to the organization's employees and other interested parties serves to motivate employees and encourage public understanding and acceptance of the organization's efforts to improve its environmental performance.

Items that might be included in reports are the organization's:

- profile;
- environmental policy, objectives and targets;
- environmental management processes;
- environmental performance evaluation;
- opportunities for improvement;
- independent verification of the contents.

An interested party refers to any person or organization outside of your organization and may include:

- customers or suppliers;
- all levels of government;
- members of the public;
- industry associations;
- non-government organizations (NGOs or ENGOs);
- local interest groups;
- media;
- fire departments;
- financial institutions and insurance companies, etc.

6.5.14 Emergency Preparedness and Response - Clause 4.4.7

Clause 4.4.7 asks whether:
the organization has:

- *established and maintained procedures:*
    - *to identify the potential for and response to accidents and emergency situations, and*
    - *for preventing and mitigating the environmental impacts that may be associated with accidents and emergency situations.*
- *reviewed and revised, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations.*
- *periodically tested its emergency preparedness procedures.*

This requirement means that your organization must identify the **potential accident and emergency situations** associated with its operations, not just environmental. Figure 39 illustrates some potential emergency situations:

Figure 39

Potential Emergency Situations

Bomb threat	Equipment failure	Evacuation
Explosion	Fire	Leak
Leak - toxic materials	Leak - corrosive materials	Power failure - hours
Leak - flammable gases	Leak - nonflammable gases	Spill (Large) - flammable
Power failure – days	Shut down – emergency	Train derailment
Spill (large) – nonflammable	Spill (large) - toxic material	Vehicle fire

Further, the organization must identify how it will **respond** to an accident or emergency situation and the steps it is taking to prevent such occurrences.

6.5.15 Nonconformance and Corrective and Preventive Action - Clause 4.5.2

Clause 4.5.2 asks whether:

the organization has established and maintained procedures for:

- *defining responsibility and authority for handling and investigating nonconformance;*
- *taking action to mitigate any impacts caused and for initiating and completing corrective and preventive action;*

any corrective or preventive action taken to eliminate the causes of actual and potential nonconformances shall be appropriate to the magnitude of problems and commensurate with the environmental impact encountered.

the organization shall implement and record any changes in the documented procedures resulting from corrective and preventive action.

A nonconformance is a deficiency in the organization's ISO 14001 EMS. Examples of EMS nonconformances include:

- the environmental policy lacks commitment to prevention of pollution - clause 4.2;
- a significant environmental aspect of your operation is not identified - clause 4.3.1;
- an environmental target is not achieved by its documented due date - clause 4.3.3;
- staff are unaware of who the management representative is for the EMS - clause 4.4.1;
- the management representative does not report to management on the performance of the EMS - clause 4.4.1;
- activities that could create significant impacts are performed by untrained staff - clause 4.4.2;
- documented environmental operating criteria were exceeded - clause 4.4.6 b;
- an accident resulting from not following an EMS procedure - any clause requiring a documented procedure;
- environmental training records are not up to date - clause 4.5.3;
- corrective actions do not record the related documented procedure changes - clause 4.5.2; and,
- audit results are not considered in the Management Review - clause 4.6.

Responsibility for dealing with environment-related problems and the manner in which they are handled must be clearly known throughout the organization.

The findings, conclusions, and recommendations reached as a result of measuring, monitoring, performing audits and other reviews of the environmental management system should be documented, and the necessary corrective action and preventive action identified. Management should ensure that these corrective and preventive actions have been implemented and that there is systematic follow-up to ensure their effectiveness.

A corrective action is any action taken to eliminate the cause of a nonconformance or other unwanted situation so that it does not happen again.

A preventive action is an action taken to avoid the occurrence of an accident or spill, for example, inspection of a machine or process often allows actions to be taken which avoids more serious events occurring.

6.5.16 Records- Clause 4.5.3

Clause 4.5.3 asks whether:
the organization has established and maintained procedures for:

- *defining responsibility and authority for the identification, maintenance and disposition of environmental records, including training records and the results of audits and reviews;*
- *the legibility, identifiability and traceability of records to the activity, product involved;*
- *storing and maintaining in such a way that records are retrievable and protected against damage, deterioration or loss.*
- *establishing and recording retention times for records.*
- *keeping records to demonstrate conformance to ISO 14001.*

Your organization's environmental records could include information on many of the following:

- environmental aspects of your organization's activities, products or services;
- significant environmental aspects;
- legal and other requirements, including permits;
- objectives and targets;
- environmental management programs;
- training records;
- complaint records;
- product information;
- pertinent contractor and supplier information;
- emergency preparedness and response tests;
- incident reports;
- monitoring and measuring data;

- audit results; and,
- management reviews.

Some considerations related to environmental records include the following:

Identification -	How is the record uniquely identified - traced to the activity, product or service where it originated
Collection -	How is the record collected - paper or electronically? The person responsible for collection should ensure that records are legible.
Index -	In what order are the records kept - date, location, alphabetical, etc.?
Filing Method -	How are records filed - computer directory, filing cabinet location? Indicate if records are archived in different locations.
Storage -	What other environmental or other physical conditions are required to prevent loss or deterioration, etc.?
Access - Authorization	Depending upon the sensitivity and importance of the records, are there requirements for controlling access - sign-in, sign-out, secure room, etc.?
Maintenance -	What is done to ensure records are up to date and in good condition?
Retention Time -	How long are records retained? Consider legal and customer requirements.
Disposition -	Are there special requirements for the disposal of records, such as shredding?

6.5.17 Environmental Management System Audit - Clause 4.5.4

Clause 4.5.4 asks whether:

the organization has established and maintained a program and procedures for periodic environmental management system audits to be carried out in order to:

- *determine whether or not the environmental management system:*
  - *conforms to planned arrangements for environmental management including the requirements of ISO 14001;*
  - *has been properly implemented and maintained.*
- *provide information in the results of audits to management.*

the organization's audit program, including any schedule, is based on the environmental importance of the activity concerned and the results of previous audits.

the audit procedures cover the scope, frequency and methodologies, as well as the responsibilities and requirements for conducting audits and reporting results.

An EMS audit confirms or verifies whether an organization's EMS conforms to the ISO 14001 standard. An audit should done periodically, keeping in mind the results of previous audits, but at least once a year. An audit should focus on those areas of its operations that are critical to good environmental performance.

The focus of an audit is on the management system, not on the people in the organization. Conclusions must be based on objective evidence.

The results of an audit should indicate whether the EMS is properly implemented and maintained and can be done on:

- a clause by clause approach - clause 4.1 through clause 4.6; or,
- a department within the organization approach, or,
- an activity or process approach.

The audit report should be concise and outline the following:

- audit objectives;
- audit scope;
- audit team members;
- summary of strengths of the system;
- summary of nonconformances;
- summary of corrective actions needed and timelines;
- recommendations; and,
- overall conclusions.

6.5.18 Management Review - Clause 4.6

Clause 4.6 asks whether top management, at intervals:

reviews the environmental management system to ensure:

- *its continuing suitability, adequacy and effectiveness.*
- *the necessary information is collected to allow management to carry out this evaluation;*

ensures the review:

- *is documented;*
- *addresses the possible need for changes to policy, objectives and other elements of the EMS system, in light of the EMS audit results, changing circumstances and the commitment to continual improvement.*

The management reviews of the EMS system should be done at least annually. The review should be broad enough in scope to address the environmental dimensions of all activities, products and services of the organization, including their impact on financial performance. The review should include:

- environmental objectives and targets and environmental performance;
- the findings of environmental audits;
- the organization's environmental policy in relation to:
  - changing legislation;
  - changing expectations and requirements of interested parties;
  - changes in products or activities of the organization;
  - advances in technology.

Part 7

Measuring Your Progress

7.0 What is the Payback?

ISO 14001 registration / compliance is the means by which environmental and financial benefits can be achieved. The payback comes in the form of quantifiable and non-quantifiable benefits and increased competitiveness. Measurement is key if financial and environmental benefits are to be optimized.

7.1 Non Quantifiable Benefits

The non-quantifiable benefits of ISO 14001 compliance include:

- having an effective "due diligence" defence should your company break an environmental law;
- improved confidence on the part of your bankers and insurance companies;
- comfort in knowing:
  - the environmental impact of your processes, products and services;
  - your employees can handle an environmental emergency;
  - your employees are operating in a safe manner;
- the ability to respond positively to your customers should they demand that you have an environmental management system in place;
- educating your employees about the benefit of follow-up;
- promoting a positive "cultural" change within the company;
- enhanced intra-company communications, resulting from better documentation and team building;
- greater environmental awareness among employees;
- instilling pride in your company's service and products;
- engendering a commitment to the environment;
- helping ensure your employees are properly equipped;
- getting buy-in from your employees to your company's environmental policy;
- increasing your customers' confidence in your company and its products and services;
- providing information needed to determine the true impact of decisions; and,
- possible regulatory relief from governmental agencies.

These are qualities that distinguish a company from its competition and lead to enhanced competitiveness.

7.2 Quantifiable Benefits: Objectives and Targets

Your environmental policy establishes the framework for setting environmental objectives and targets. These can be broadly or narrowly focused, but should be achievable and practical. Figure 40 illustrates how the relationship between objectives and targets.

Figure 40

Relationship between Environmental Objectives and Targets

	Environmental Objective	Environmental Target
1.	Minimize the risk for water pollution wherever technically and commercially practical.	To eliminate zinc phosphate emissions by 50% within 1 year.
2.	Minimize the use of water wherever technically and commercially practical.	To reduce water use by 50 per cent, by October 31, 1999
3.	Minimize the use of electricity, wherever technically and commercially practical.	To reduce electrical usage 10 per cent by October 31, 2000.
4.	To meet air emission standards, given a 100 per cent increase in production.	To reduce the cost of air emission incinerator and water chilling equipment by 10 per cent while increasing the capacity of each and improving the risk factor by 50 ? per cent.

Figure 41 illustrates potential environmental and financial performance measures, the data for which can be obtained from the historical data worksheet.

Figure 41

Example Environmental and Financial Performance Measures

	EPM Element	Formula Where Applicable
1	Material Productivity Index	Weight of product produced + by product -- x100 weight of product in (recycled + raw material}
2	Energy Intensity Index	Joules ---------------- x100 production
	Financial ROR	
3	Cost of Compliance	$ cost to meet environmental laws and regulations
4	ROI / ISO 14001 Investment	Savings from implementing ISO 14001 -- = ? % Cost of implementing ISO 14001
5	Production Units	annual production (tonnes or units)

	EPM Element	Formula Where Applicable
	Utilities	
6	Electricity	Kwh of electricity per year
7	Natural gas	cubic meters of natural gas per year
8	Water	cubic meters of water per year
	Emissions	
9	Solid waste	Tonnes of solid waste to landfill per year
10	Manifest solid waste	Tonnes of manifest solid waste per year
11	Liquid waste	Litres of liquid waste per year
13	Manifest liquid waste	Litres of manifest liquid waste per year
	Air	
14	VOC	
15	NOx	

Figure 42 is a template for the collection of historical data on the company's operations. The data collected can be used to develop environmental and financial performance measures as seen in figure 41.

Figure 42

Historical Data

					Forecast	% Change
	Measure	1995	1996	1997	1998	98 vs. '95
1.	**Production**					
2.	*Production (tonnes)*					
3.	*Production % Change*					
4.						
5.	**By Product (if any)**					
6.	*(tonnes)*					
7.	*% Change*					
8.						
9.	**Raw Material Purchased (tonnes)**					
10.	*(tonnes)*					
11.	*% change*					
12.						
13.	**Recycled Material (if any)**					
14.	*(tonnes)*					
15.	*Change*					
16.	*Revenue*					
17.	*Revenue % Change*					
18.	*Recycled in Plant (tonnes)*					

Historical Data						
					Forecast	% Change
	Measure	1995	1996	1997	1998	98 vs. '95
19.	*Recycled in Plant % Change*					
20.						
21.	**Material Productivity Index**					
22.						
23.	**Solid Waste Disposal**					
24.	*Solid Waste (Tonnes)*					
25.	*Solid Waste Cost*					
26.	*Solid Waste Cost % Change*					
27.	*Solid Waste as % of Production*					
28.	*Manifest Solid Waste*					
29.	*% Change*					
30.						
31.	**Electricity kwh**					
32.	*Electricity kwh % Change*					
33.	Value					
34.	*Electricity Value % Change*					
35.	*Electricity Intensity*					
36.	*% Change in Electricity Intensity*					
37.						
38.	**Natural Gas (Cu. metre)**					
39.	*Natural Gas cm % Change*					
40.	Value					
41.	*Natural Gas Value % Change*					
42.	*Natural Gas Intensity*					
43.	*% Change in Natural Gas Intensity*					

Objectives, Targets and Competitiveness

Figure 43 illustrates the linkage between objectives and targets and competitiveness.

Essentially, four analytical "streams" can help identify meaningful environmental objectives and targets:

- Stream #1 - an analysis of your company's historical data (see Figure 44 for a sample historical data worksheet);

- Stream #2 - an analysis of your company's activities, aspects and impacts (see clause 4.3.1 of the standard);

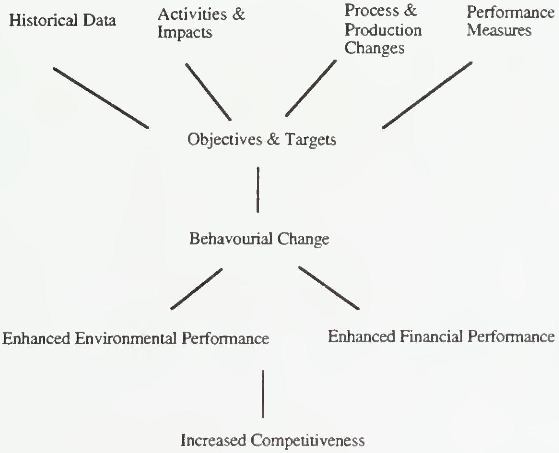
- Stream #3 - an analysis of the opportunities to redesign and / or replace production / environmental control equipment required to meet legislated emission requirements, arising, for example, from an increase in production capacity.

- Stream #4 - setting environmental and financial performance measures; (see Figure 43 for performance measures relevant to most companies);

Once objectives and targets have been established, behavioural change is required to achieve them. This in turn should result in enhanced environmental and financial performance and thus competitiveness.

Figure 43

Objectives, Targets and Competitiveness


Historical Data
Activities & Impacts
Process & Production Changes
Performance Measures
Objectives & Targets
Behavourial Change
Enhanced Environmental Performance
Enhanced Financial Performance
Increased Competitiveness

Part 8

ISO 14001 Registration / Compliance

8.0 Registration

This section reviews:

- the registration process and its alternative, self declaration, as alternative ways to demonstrate compliance with ISO 14001;
- the benefits of registration / self declaration; and
- ISO 14001 and the "law" (due diligence).

8.1 Selecting a Registrar

ISO 14001 registration by an independent third-party registrar is not mandatory.

A company may chose to "self declare" compliance with the standard - this is called first-party compliance. Alternatively, it may prefer to become registered by an independent third-party registrar.

Whichever route is chosen, compliance to ISO 14001 is based on the facility or part of the facility in which the manufacturing or service activity is being conducted.

The decision to "self-declare" or to become registered by a "third-party" registrar will depend on the circumstances. Usually it is a trade-off between:

- avoiding the cost of third-party registration (if you go the "self declaration" route), and
- the security of knowing that an independent third-party has evaluated your EMS system and found that it complies with ISO 14001.

An independent third-party check can be advantageous should your company be charged with an environmental offence and you need to establish that you have taken all reasonable steps - i.e. "due diligence".

Regardless whether you "self declare" or become registered to ISO 14001 by a third-party registrar, it is essential that your EMS stay compliant to the ISO 14001 standard.

This means regular and frequent audits of your system.

There are two types of "third-party" registration audits:

- initial audits, and
- maintenance audits.

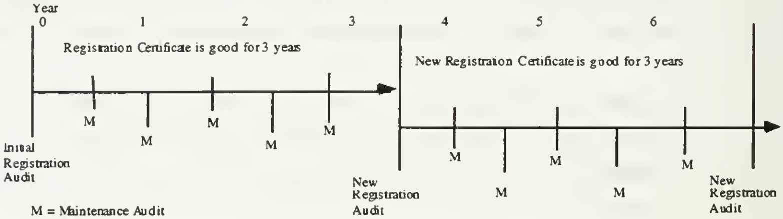
To maintain your "third-party" ISO 14001 registration certificate, it is necessary to have a maintenance audit from your registrar at least once a year. Some registrars do a partial maintenance audit every 6 months. This is said to be less intrusive on a company's day-to-day operations.

At the end of the third year, a new registration certificate is required. This means another initial audit. See Figure 44.

A certificate of registration is usually issued for three years following an initial audit.

Figure 44

Initial and Maintenance ISO 14001 Registration


Year
0
1
2
3
4
5
6
Registration Certificate is good for 3 years
New Registration Certificate is good for 3 years
M
M
M
M
M
M
M
M
M
M
Initial Registration Audit
New Registration Audit
New Registration Audit
M = Maintenance Audit

Registration costs vary depending on the size and complexity of the company being audited and the location of the facility among other factors.

Registration costs can also increase if you contact a registrar too early and your company is not yet ready to be audited.

8.2 Benefits of Registration / Compliance

As yet, in Canada, there is no legal requirement to become compliant with, or registered to, ISO 14001. In other words, compliance to ISO 14001 is voluntary.

One exception is the 1996 Prospect Chemical case in Alberta in which the judge required the company to implement an ISO 14001 EMS and become registered or pay $40,000. as part of its penalty for having broken the Alberta Environmental Protection Act.

There are four key questions that you should ask when considering implementing an ISO 14001 EMS. These are:

	Yes	**No**
Question #1		
• am I satisfied that my current environmental management system, assuming I have one, gives me a "due diligence" defence should my company contravenes an environmental law?	☐	☐
Question #2		
• do I know the cost to my "bottom line" of my company's environmental impacts - scrap, air and water effluent and solid waste ?	☐	☐
As well:		
a) will an EMS system, like ISO 14001, give my company a marketing edge?	☐	☐
b) will my bank and / or insurance company give preference if my company has an EMS system in place, or penalize it if it does not?	☐	☐
c) will an effective EMS system improve my company's bottom line?	☐	☐

	Yes	No
Question #3		
• are my customers, including export customers, likely to demand that I show evidence that my company has an EMS in place or that my company supplies environmentally "friendly" products?	☐	☐
Question #4		
• is government likely to demand my company demonstrate that it has an EMS in place as a condition of obtaining a licence or as an inducement to achieving regulatory relief?	☐	☐

You may not be able to answer all of these questions, but if you answer no to questions 1 and 2 and yes to questions 2 (a), (b) and (c), 3 and 4, then, you should seriously consider putting in place an effective an ISO 14001 EMS.

8.3 ISO 14001 and The Law: Due Diligence

ISO 14001 is the logical culmination of developments in Canadian environmental protection law in the last 15 years or so. It represents a merging of management techniques and compliance measures.

The law requires a company to protect the environment. A breach of the law exposes:

- companies to the risk of substantial fines and control or stop orders (in effect management can lose control of its business);
- employees and officers / directors to the risk of fines and / or jail sentences;
- companies and individuals to adverse publicity.

There are three categories of offences in Canada:

- **Mens Rea Offences** -- These offences require proof of the intent to commit an unlawful act in order to establish guilt,

- **Absolute Liability Offences** -- For these offences guilt automatically follows if the Crown proves that the defendant committed the act.

  In other words, no defences, including the lack of intent or the defence of "due diligence", are available in absolute liability offences, and

- **Strict Liability Offences** -- For these offences, proof is required that the defendant committed the prohibited act, but a finding of not guilty is permitted, if the defendant can prove that he/she used "due diligence" to comply with the law.

Breaches of environmental protection legislation fall within the "strict liability" category of offences.

If your company is charged with an offence under an environmental protection law, the Crown needs to prove beyond a reasonable doubt that you committed the prohibited act.

The onus of proof then shifts to you to establish that you exercised "due diligence", of which there are two types:
- first, you can establish that the prohibited act did not occur (which could be difficult); or
- second, you can establish that you took reasonable steps to avoid the particular prohibited event.

Canadian Courts have accepted that an environmental management system (EMS) is critical to establishing "due diligence "(Supreme Court of Canada in R. v. Sault Ste. Marie).

The court went further and, in the R. v. Bata Industries Ltd. decision, provided a detailed link between due diligence and environmental management systems when the Judge spelt out the measures which companies and their directors should have in place if they are to be successful in the defence of "due diligence". These measures include:

- a system to prevent the commission of a breach of environmental protection laws;
- reasonable steps to ensure the effective operation of that system, including supervision and inspection;
- continuous improvements in business methods;
- an awareness of the standards of the industry and other industries which deal in similar pollutants or risks;
- an emergency response plan;
- a system of reports for officers and directors on the operation of the pollution prevention system and specific reports on emergencies (for example, a spill);
- measures to ensure responsiveness to third party notices including those from government agencies;
- training programs; and
- a system of ongoing environmental audit.

What the Court was describing in the Bata decision were the essential building blocks of an environmental management system. Coincidentally, these are the same building blocks of ISO 14001.

A defendant which has an effective environmental management system in place (like ISO 14001) is far more likely to be able to successfully establish the defence of "due diligence" than a defendant which has no environmental management system.

ISO 14001 registration does three things:

- it formalizes an environmental management system, including providing a mechanism for a regular audit (at least once every 12 months) of its effectiveness;
- provides for an independent, third party attestation of the existence of an effective environmental management system; and
- it uses the same building blocks and vocabulary as sound management practices (as found in ISO 9000).

Because of this, ISO 14001 registration is an advance over simply having an environmental management system, however, effective it may be.

Companies achieving ISO 14001 registration can be satisfied they have an effective EMS in place. However, ISO 14001 registration should not be viewed as an absolute defence, as each case will turn on its own facts. Further, ISO 14001 is not proof of compliance with environmental legislation.

Part 9

Sources of Assistance

9.0 Sources of Information

There are a variety of sources of information about ISO 14001, including:

- ISO 14001 on-line information
- interpretations of the standard
- where to purchase the ISO 14000 standards
- where to obtain copies of legislation
- pollution prevention and ISO 14000

9.1 ISO 14001 On Line

The Internet has a number of informative ISO 14000 sources of information with its collection of World Wide Web sites, news groups and electronic mailing lists.

Here are some that you might find of interest:

General Information

- ISO World (http://www.omninet.co.jp/isoworld/)
  This site contains ISO 14000 information and lists companies certified to ISO 14001 and BS 7750 in Japan.
- The ISO 14000 Info Center: (http://www.iso14000.com).
  This site contains:
  - lists of acronyms that can easily be saved and referred to as needed;
  - a place for publishers of books, newsletters and other resources to advertise their wares.

Standards Information

- Standards Council of Canada Web site (http://www.scc.ca) or (info@scc.ca)
  This site provides general information on standards, including a price list.

- ISO Online - International Organization for Standardization - (http://www:iso.ch).
  This site contains information on:
  - the full range of ISO activities, ISO procedures,
  - a listing of technical committees, meeting schedules and ISO member bodies.

- The American Society for Quality Control's (ASQC's) home page (http://www.asqc.org).
  This site has information on:
  - all of ASQC's standards related activities;
  - its publications and order desk; and
  - information about ISO 14000 and ISO 9000 registration accreditation programs in the United States.

Government

- The U.S. Environmental Protection Agency (EPA) Home Page (http://www.epa.gov).
  The site contains:
  - environmental compliance information, including the new EPA policy on environmental auditing;
  - links to EPA regional offices where programs using ISO 14000 are underway; and
  - links to other government web sites.

- To scan the Federal Register, contact the U.S. Government Printing Office (GPO) Access at (http://www.access.gpo/su-doc/aces/aces140.html).

9.2 Interpretations to the ISO 14001 Standard

Occasionally a company may be unsure how a particular section of the standard applies to it and may want to verify its meaning. In other words, they would like someone to explain it.

Interpretations of ISO 14001 standards should be addressed to the:

Canadian Standards Association
Standards Division
178 Rexdale Boulevard
Rexdale ON M9W 1R3

Requests for an ISO 14001 interpretation should:

- define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch
- provide an explanation of circumstances surrounding the actual field condition, and
- be phrased, where possible, to permit a "yes" or "no" answer.

Interpretations are published in CSA Information Updates. For details phone the Canadian Standards Association (416) 747-4116.

9.3 Where to Purchase ISO 14000 Standards

ISO 14000 standards can be purchased from the Standards Council of Canada through their sales division, Global Info Centre Canada.

Call toll free at **1-888-782-6327**, or fax your order to **1-613-237-4251**.

Figure 45 lists the ISO 14000 standards available and their prices, as at July 15, 1998. All individual standards are shipped from Global's Denver office.

The minimum cost for shipping is $20.00 by DHL Courier. The cost is determined by the weight of the shipment. Global assumes any cost of brokerage and custom fees. All prices are in Canadian currency.

Figure 45

Standard	Description	Price
ISO 14001	Environmental management systems - Specification with guidance for use	$77.00
ISO 14004	Environmental management systems - General guidelines on principles, systems and supporting techniques	$126.00
ISO 14010.	Guidelines for environmental auditing - General principles of Environmental Auditing	$44.50
ISO 14011	Guidelines for environmental auditing - Audit procedures - Part 1: Auditing of environmental management systems	$50.50
ISO 14012	Guidelines for environmental auditing - Qualification criteria for environmental auditors	$50.50
ISO 14020	Guidelines Labeling - General Principles	$68.50
ISO 14021	Guidelines Labeling - Self Declaration Environmental Claims - Terms of Definitions	$107.00
ISO 14022	Guidelines Labeling - Environmental Labels and Declaration Self Declaration - Environmental claims –symbols	$75.50
ISO 14024	Guidelines Labeling - Practitioner Programs, Guiding Principles, Practices, and Certification Procedures of Multiple criteria	$107.00
ISO 14031	Environmental Management - Environmental Performance Evaluation – Guidelines	$75.50
ISO 14040	Life cycle assessment - Principles and Practices	$107.00
ISO 14041	Environmental Management - Life Cycle Assessment - Goal and Scope Definition and Inventory Analysis	$89.00
ISO 14042	Environmental Management - Life Cycle Assessment - Life Cycle Impact assessment	$75.50
ISO 14043	Environmental Management - Life Cycle Assessment - Life Cycle Impact Interpretation	$75.50

Standard	Description	Price
ISO 14050	Environmental Management – Vocabulary	$107.00
ISO Guide 64	Guide for the inclusion of environmental aspect in product standards	$56.50
ISO 14000 Compendium	Complete Collection in Hard copy	$230.00 + $20.00 S / H
ISO 14001 CD - ROM	Complete Collection on CD – ROM	$340.00 + $20.00 S / H

Information on the ISO 14000 series and the Standards Council of Canada is also available on the Internet at **www.scc.ca** or **info@scc.ca**.

9.4 Where to Obtain Environmental Legislation, Regulations and By-Laws

Copies of federal, Ontario and municipal legislation, regulations, and by-laws are available from the following sources:

Figure 46

Federal Legislation / Regulations	Ontario Legislation / Regulations
Environment Canada's website (www.doe.ca /who/acteng.html)	Ministry of Environment's website (www.ene.gov.on.ca)
Government of Canada's website (Canada.justice.gc.ca/Loireg/index_en.html)	Publications Ontario (800-668-9938) (www.gov.on.ca/MBS/english/publications /stratregs/index.html)
Local Library	Local Library
Municipality	
Contact municipality concerned	

9.5 Pollution Prevention and ISO 14001

One of the steps in becoming compliant with ISO 14001 is that an organization is required to evaluate the significance of actual or potential environmental impacts of its activities, products or services (in other words, it must assess risk).

The identified significant impacts are then considered in identifying the organization's objectives and targets. The establishment and achievement of objectives and targets is the mechanism by which continuous improvement (e.g., the reduction of cost and risk) is realized in ISO 14001.

According to the Task Force on the Metal Finishing Industry, the evaluation significance and its prioritization as required by ISO 14001 closely resembles the procedures outlined in the Metal Finishing Pollution Prevention Guide and could easily be adapted to the evaluation of significance requirements of ISO 14001.

For copies of the Guide or for further information on Pollution Prevention contact:

John Nagata
Project Coordinator
Metal Finishing Pollution Prevention Project
Tel. or Fax: 519-681-5590

The following are other sources of information on pollution prevention. For a full description of the document, please see the web site identified below each publication.

1. Metal Finishing P2 Guide

Abstract:

Metal Finishing Pollution Prevention Guide. Availability: Federal Department of the Environment (DOE), Canadian Association of Metal Finishers (CAMF), American Electroplaters and Surface Finishers Society (AESF), Automotive Parts Manufacturers' Association (APMA), Metal Finishing Suppliers.
http://c2p2.sarnia.com/hot/metal-finishing/guides/s220.html - size 2,727 bytes - 7/14/98 6:59:57 PM GMT

2. Ontario MFI P2 Project

Abstract:

The Ontario Metal Finishing Pollution Prevention Project. The Ontario Metal Finishing Pollution Prevention Project (the Project) is a voluntary cooperative effort between the Canadian Association of Metal Finishers CAMF) the American Electroplaters and Surface Finishers Society (AESF) the Metal Finishers… http://c2p2.sarnia.com/hot/metal-finishing/programs/intromfi.html - size 3,396 bytes - 9/26/97 1:29:53 PM GMT

3. Tool Kit for Metal Finishers

Abstract:

Pollution Prevention: A Tool Kit for Metal Finishers. University of Nebraska Cooperative Extension & Biological Systems Engineering, 1995. This "tool kit" will help businesses identify wastes, both hazardous and non hazardous, while keeping pollution prevention in… http://c2p2.sarnia.com/hot/metal-finishing/guides/s221.html - size 2,504 bytes - 5/7/98 4:11:39 PM GMT

4. P2 and Best Management Practices

Abstract:

Pollution Prevention and Best Management Practices for Metal Finishing Facilities. Broward County Department of Natural Resource Protection, Pollution Prevention and Remediation Programs Division, August 1994. This document was designed for Broward County metal… http://c2p2.sarnia.com/hot/metal-finishing/guides/s219.html - size 2,696 bytes - 2/19/98 6:01:54 PM GMT

5. Metal Finishing in Arizona

Abstract:

Metal Finishing in Arizona Pollution Prevention Opportunities, Practices and Cost Benefits. Arizona Department of Environmental Quality. August 1995. This guide provides assistance to metal finishers in reducing pollution through economically and environmentally sound measures… http://c2p2.sarnia.com/hot/metal-finishing/guides/g001.html - size 2,654 bytes - 5/6/97 6:58:00 PM GMT

6. MFI 2nd Progress Report / MFI Third Progress Report / MFI Fourth Progress Report

Abstract:

Metal Finishing Industry P2 Project: Second Progress Report. Federal Department of the Environment (DOE) Canadian Association of Metal Finishers (CAMF) American Electroplaters and Surface Finishers Society (AESF) Automotive Parts Manufacturers Association (APMA) ...

http://c2p2.sarnia.com/hot/metal-finishing/programs

7. Hot Topics - Metal Finishing Intro

Abstract:

Metal Finishing. Fact Sheets. Guides. Key Contacts. Programs. Success Stories. Training. 1-800-667-9790. CANADIAN CENTRE FOR POLLUTION PREVENTION (C2P2) Canada's Foremost Pollution Prevention Resource. SITE MAP. NEW. HELP-LINE. SEARCH. E-MAIL. MAIN PAGE. Ontario Metal Finishing Industry Pollution Prevention.

http://c2p2.sarnia.com/hot/metal-finishing/intro.html - size 10,434 bytes - 6/30/98 4:02:51 PM GMT

8. What's New in P2 August 1997 Edition

Abstract:

What's New in P2 August Edition. P2 News Draft Environmental Management Agreement between Dofasco, Inc. Environment Canada and the Ontario Ministry of Environment and Energy (MOE) Dofasco Inc. of Hamilton, Environment Canada and the Ontario MOE have negotiated a draft Environmental Management Agreement...

http://c2p2.sarnia.com/whatsnew/august97.html - size 10,227 bytes - 1/20/98 7:30:36 PM GMT

9. What's New in P2 Feb. '98 Edition

Abstract:

What's New in P2" February 1998 Edition. P2 News Canadian Council of Ministers of the Environment (CCME) Pollution Prevention Award Winners. The CCME announced the 1997 P2 award winners January 29/98. This program gives national recognition to companies and organizations showing leadership in pollution prevention.

http://c2p2.sarnia.com/whatsnew/feb98.html - size 9,865 bytes - 2/6/98 4:31:36 PM GMT

10. Instruments for Advancing P2 and Cleaner Production

Abstract:

The European Round Table on Cleaner Production (ERCP) was held in Oslo, Norway, from November 1-3, 1997. The objective of the ERCP 97 was to contribute to the critical evaluation and dissemination of cleaner production options and programs, and also to highlight the mechanisms aimed at accomplishing…

http://c2p2.sarnia.com/hot/across-canada/federal/leadership/instruments.html - size 33,651 bytes - 1/5/98 7:44:58 PM GMT

11. At the Source Winter 1998 Edition

Abstract:

At the Source. Total Cost Assessment Preparing the Business Case for Pollution Prevention William R.K. Reid, Stirling Fraser and Chris Schoeffel. P2 Award Winners . New on the C2P2 Website. Winter 1998. paring the Business Case for Pollution Prevention William R.K. Reid, Stirling Fraser and Chris Schoeffel …

http://c2p2.sarnia.com/newsletter/winter98.html - size 30,551 bytes - 5/13/98 5:25:54 PM GMT

12. Available Publications Listing

Abstract:

Available Pollution Prevention Publications. July 1998. 1-800-667-9790. CANADIAN CENTRE FOR POLLUTION PREVENTION (C2P2) Canada's Foremost Pollution Prevention Resource. All publications are free unless otherwise indicated. http://c2p2.sarnia.com/info/avail-pubs.html - size 70,629 bytes - 7/14/98 6:59:11 PM

9.6 ISO 14001 Software Demonstration Disks

ISO 14001 computer software has been developed by a number of companies. If you are interested in a free demonstration disk, please contact the companies listed below.

Greenware Environmental Systems Inc.
#200, 145 King St., East
Toronto, Ontario M5C 2Y8
Tel: 416-36-5577
Toll Free: 1-800-474-0627
Fax: 416-367-2653
e-mail: greeninfo@greenware.ca
www.greenware.ca

Intelex Corporation
ISO*soft* 14001
93 Skyway Ave.
Suite 206
Etobicoke, Ontario M9W 6C7
Tel: 416-679-0119
Toll Free: 1-800-387-4019
Fax: 416-679-0168
e-mail: intelex@intelex.com
www.intelex.com

Caribou Systems Corporation
#605, 4211 Yonge St.
Toronto, Ontario, M2P 2A9
Tel: 416-224-9910
Toll Free: 1-800-281-8391
Fax: 416-224-0313
e-mail: info@caribousystems.com
www.caribousystems.com

Phyper & Associates Ltd.
99 Atlantic Ave., Suite 402
Toronto, Ontario M6K 3J8
Tel: 416-516-2337
Fax: 416-516-2837
e-mail: 102017@compuserv.com

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Appendix 1

Questions to Ask a Consultant

ISO 14001 implementation typically results in significant change in your company's operations, management style and culture.

Because of this, and because a consultant will both command significant fees and be involved with your staff at all levels for a prolonged period of time, the selection of a consultant to aid you with your implementation is an important decision.

To assist you in your selection task, the Alliance, in conjunction with experienced consultants, prepared questions you may wish to ask a prospective consultant before making your final choice.

The relative importance of each item will vary from person to person and organization to organization.

These questions are as follows:

1. **Education**
    - Does the candidate consultant have post-secondary education? If so, at what level?
    - Is the lack of post-secondary education of any importance for the job at hand?

2. **Training**
    - Does the candidate have training or experience in specific skills that may be required to perform the task at hand?
    - For example, does the candidate have ISO specific training, training in other environmental standards, the ability to use a computer, training in group dynamics, public speaking, and other areas of importance to your organization?

3. Professional Associations

- To which professional association(s), if any, does the candidate belong?
- Do any of these professional associations have a code of ethics?
- Are these important to your business?

4. Work Experience

- What work experience does the candidate have, in terms of both length and nature? Is the candidate's experience progressive?
- Does the candidate have experience in dealing with senior management?
- Does the candidate have management experience in specific and general areas?

5. Industry Experience

- Does the candidate have experience in or understand your industry / business?
- Is a thorough understanding of your business a requisite for the project?
- Is a general understanding of your business a requisite for the project?
- Is hands-on experience in your industry / business important for the project?

6. Environmental Management Consulting Experience

- Has the candidate assisted other companies with an ISO 14001 program through to a successful registration?
- If so, what kind of companies were they?
- Did the companies have environmental management systems in place before aiming for ISO registration, or, were no formal systems in place?
- How large / complex were the companies?
- Has the candidate worked with EMS systems. If so, which?
- Has the candidate assisted any companies in successfully achieving those systems?
- How familiar is the candidate with environmental legislation and regulations?

7. **Management Consulting Experience**
   - What management systems experience does the consultant have? For example. has the candidate assisted other companies with an ISO 14001, ISO 9001 or 9002 program through to a successful registration?
   - What other management consulting experience does the candidate have?

8. **References**
   - Can the candidate provide EMS, ISO 14001, ISO 9000 or other consulting references?

9. **Flexibility**
   - Is the candidate flexible in terms of adjusting his / her schedule to the needs of your business?

10. **Other Skills**
    - Can the candidate provide and / or direct you to resources in ISO 14001 training, documentation, or other areas which you think may be needed during the project?

11. **Security**
    - Does the candidate have any conflicts of interest? (Remember the successful candidate will be able to observe and analyze virtually all phases of your company's operations)
    - Is the candidate willing to sign a non-disclosure agreement?

12. **Overall Impression**
    - Is the candidate's proposal competitive, understandable and relevant to your business?
    - Could you and your employees (at all levels) work with this candidate for a prolonged period of time?
    - Is the candidate the type of person that you are willing to introduce to your peers or superiors?
    - Is the candidate the type of person in whom you would be willing to confide sensitive company matters, if required?

Appendix 2

ISO 14001 Consultants: A List

If you decide to use a consultant, which one is "qualified" to help you implement ISO 14001?

To help answer this question, the Alliance invited some 50 consultants, five registrars and the Standards Council of Canada to participate in a Seminar / Workshop to discuss the minimum qualification criteria for ISO 14001 consultants.

A questionnaire and criteria were subsequently developed by a volunteer committee to screen consultants.

The following consultants have been deemed to meet those criteria. These consultants have indicated that they can implement ISO 14001 and can provide references. Inclusion of a consultant on this list does not constitute an endorsement or recommendation by the Alliance, however.

Once you have developed a short list of potential consultants, Appendix 1 for some questions you might like to ask the candidates. The consultants who are also Alliance members are highlighted by the Alliance logo.

The Alliance strongly recommends that the references of each consultant be checked.

Following each consultant listing, we show the industry sector in which he / she has indicated experience. Figure 47 below indicates the number assigned to each industry sector.

Figure 47

Sector	Number		Sector	Number
Agriculture, Fishing	1		Leather and Leather Products	2
Mining & Quarrying	3		Wood & Wood Products	4
Food Products, Beverages & Tobacco	5		Publishing Companies	6
Textiles & Textile Products	7		Printing Companies	8
Metalworking	9		Electronic	10
Pulp, Paper & Paper Products	11		Chemicals, Chemical Products and Fibres	12
Automotive, etc.	13		Transportation	14
Business Services	15		Wholesale Trades	16
Rubber and Plastic Products	17		Non-Metallic Mineral Products	18
Concrete, Cement, Lime, Plaster	19		Basic Metals and Fabricated Metal Products	20
Machinery and Equipment	21		Pharmaceuticals	22
Electrical and Optical Equipment	23		Shipbuilding	24
Aerospace	25		Nuclear Fuel	26
Other Transport Equipment	27		Recycling	28
Electricity Supply	29		Gas Supply	30
Water Supply	31		Construction	32
Retail Trades	33		Hotels and Restaurants	34
Transport, Storage & Communication	35		Engineering Services	36
Public Administration	37		Education	38
Health and Social Work	39		Other Social Services	40
Oil and Gas	41		Property Management	42
Government	43		Forestry	44

Ontario

The consultants who are also members of the Alliance of Manufacturers and Exporters Canada are shown with Alliance symbol following their listing.

B.R.I. International Inc.
110-2570 Matheson Blvd. E.
Mississauga, Ontario
Contact: Bob White
Tel: 905-629-8788
Fax: 905-629-8798
E-mail: bri@bri.ca
Sectors: 8, 13, 17, 22, 36, 41

C.D. Enterprises
947 Rambleberry Ave.
Pickering, Ontario
L1V 5Y9
Contact: Clive Devers
Tel: 905-837-1211
Fax: 905-837-1943
Sectors: 1, 3, 9, 11 to 13, 15, 34.

Angus Environmental Limited
1127 Leslie Street
Don Mills, Ontario
M3C 2J6
Contact: David Hopper
Tel: 416-443-8361
Fax: 416-443-8380
E-mail: ael@interlog.com
Sectors: 3, to 14, 17 to 25, 27, 28, 29, 33 to 39.

Bowie Environmental Edge Management & Assessment Ltd.
PO Box 592
Brockville, Ontario
K6V 5V7
Contact: James (Jim) Bowie
Tel: 613-345-4337
Fax: 613-345-0358
E-mail: bedge@mulberry.com
Sectors: 4, 8, 9, 11, 13, 20 to 22,
32 to 34, 37, 38.

Camplong & Associates Inc.
PO Box 238
Schomberg, Ontario
L0G 1T0
Contact: Craig Camplong
Tel: 905-939-8684
Fax: 905-939-8651
E-mail: camplong@interlog.com
Sectors: 3, 9, 11 to 13, 20, 28.

C.D. Sonter Management Inc.
1109 Britannia Road East
Mississauga, Ontario
L4W 3X1
Contact: Mr. C.F. Dodaro
Tel: 905-564-4752
Fax: 905-670-0705
Sectors: 5, 7, 13, 15, 22, 28, 32 to 34,
36 to 38.

Chem Solv
PO Box 608/20848 Dalton Road
Sutton, Ontario
L0E 1R0
Contact: Peter Robertson
Tel: 905-722-6035
Fax: 905-722-5195
Sectors: 2, 6, 8 to 13, 15, 17, 19, 20,
22, 25, 28, 32 to 39.

Compliance Systems
2400 Dundas St. W., 2-273
Mississauga, Ontario
L5K 2R8
Contact: Frederic Marchal
Tel: 905-567-0004
Fax: 905-567-0004
E-mail: Compsys@Pathcom.com
Sectors: 3, 4, 6, 8, 10 to 14, 17, 18,
20 to 23, 25 to 30, 32 to 39.

Dillon Consulting
100 Sheppard Ave. E., Suite 300
Toronto, Ontario M2N 6N5
Contact: Gary Komar
Tel: 416-229-4646
Fax: 416-229-4692
Sectors: 1, 3 to 5, 8 to 15, 18 to 25, 27 to
33, 35 to 39, 41.

Environmental Auditors Limited
100 York Boulevard
Suite 240
Richmond Hill, Ontario
L4B 1J8
Contact: Richard Lawton
Tel: 905-886-7965
Fax: 905-885-7967
E-mail; rlawton@netcom.ca
Sectors: 3 to 6, 8 to 10, 12 to 18, 20, to 22,
22, 32 to 38.

Environmental & Professional Forestry
Services
1 Rolland Road
Toronto, Ontario M4G 1V4
Contact: S.T. Griffiths
Tel: 416-423-9180
Fax: 416-423-0108
E-mail: greentg@istar.ca
Sectors: 4, 11, 29.

Ernst & Young Environmental Services
Inc.
PO Box 251, 222 Bay St.
Toronto Dominion Centre
Toronto, Ontario
M5K 1J7
Contact: Randy Billing
Tel: 416-943-3690
Fax: 416-943-3792
Sectors: 3 to 5, 9 to 14, 19, 20, 25, 28.

Golder Associates Ltd.
2180 Meadowvale Boulevard
Mississauga, Ontario
L5N 5S3
Contact: Mark Cotter
Tel: 905-567-4444
Fax: 905-567-6561
E-mail: mcotter@golder.com
Sectors: 1 to 40

Hatch Associates Ltd.
2800 Speakman Drive
Sheridan Science and Technology Park
Mississauga, Ontario
L5K 2R7
Contact: Russell Pullan
Tel: 905-403-3630
Fax: 905-403-4015
E-mail: mcg@Hatchcos.com
www: http://www.hatch.ca
Sectors: 3, 9, 14, 15, 18, 20, 22, 28, 31, 32, 35, 36.

Hazard Control Systems Inc.
34 Orkney Crescent
London, Ontario
N5X 3R7
Contact: Wayne MacLeod
Tel: 519-433-9843
Fax: 519-433-9922
E-mail: wayne.macleod@sympatico.ca
Sectors: 5, 6, 8, 9, 13, 15, 20 to 22, 28 to 33, 36, 38, 39.

Jacques Whitford Environment Ltd.
2781 Lancaster Rd., Suite 200
Ottawa, Ontario K1B 1A7
Contact: Scott McDougall
Tel: 613-738-0708
Fax: 613-738-0721
E-mail: smcdouga@jacqueswhitford.com
Sectors: 1 to 17, 19 to 25, 27 to 39.

Lakefield Research Limited
Postal Bag 4300
Lakefield, Ontario
K0L 2H0
Contact: Linda Elliott
Tel: 705-652-2000
Fax: 705-652-6365
Web Site: 102213.444 @compuserve.com
Sector: 3, 4, 5, 9, 11 to 14, 17, 18, 20, 28, 29, 31, 35, 36, 37

MacViro Consultants Inc.
90 Allstate Parkway, Suite 600
Markham, Ontario L3R 6H3
Contact: Michael Longland
Tel: 905-475-7270
Fax: 905-475-5994
E-mail: 103700.2767@compuserve.com
Sectors: 1, 4, 6 to 15, 17, 18, 20, 21, 24, 25, 27, 35 to 37.

Moye Company Ltd.
59 Breadner Drive, Suite 102
Toronto, Ontario
M9R 3M5
Contact: Bohdan Dyczkowsky
Tel: 416-248-9187
Fax: 416-248-9187
Sectors: 4, 6, 7 to 21, 23, 25, 27, 28, 32, 33, 34, 36, 38.

Notra Environmental Services Inc.
2285 St. Laurent Blvd., Building C16
Ottawa, Ontario
K1G 4Z6
Contact: Stephen Burns
Tel: 613-738-0887
Fax: 613-738-4406
E-mail; notra@fox.nstn.ca
Web Site: http://fox.nstn.ca/-notra/notrapg1.html
Sectors: 1, 4, 6 to 18, 20, 21, 24, 25, 27, 35, 36, 37.

Phyper & Associates Ltd.
99 Atlantic Avenue, Suite 402
Toronto, Ontario
M6K 3J8
Contact: John-David Phyper
Tel: 416-516-2337
Fax: 416-516-2837
E-mail: 102017.3707@compuserve.com
Sectors: 3 to 5, 8 to 15, 17 to 22, 25 to 30, 32, 35 to 38,

Pilot Performance Resources Management Inc.
Bramalea Woods
PO Box 68584
1235 Williams Pkwy. East
Brampton, Ontario L6S 6A1
Contact: Jayne Pilot
Tel: 905-792-3130
Fax: 905-792-3047
E-mail: pilotiso@idirect.com
www: http://web.idirect.com/-pilotiso
Sectors: 3, 11, 12, 14, 19, 22, 23, 28, 35 to 39.

Pollutech Group of Companies Inc.
768 Westgate Road,
Oakville, Ontario
L6L 5N2
Contact: Richard Laughton
Tel: 905-847-0065
Fax: 905-847-3840
E-mail: laughton@pollutech.com
Web Site: http://www.pollutech.com
Sectors: 1 to 5, 7 to 9, 11 to 14, 17, 21, 22, 24, 25, 30 to 32, 34, 36, 37.

Proctor & Redfern Limited
45 Greenbelt Drive
Don Mills, Ontario M3C 3K3
Contact: Peter Beukema
Tel: 416-445-3600
Fax: 416-445-5276
E-mail: info@pandr.com
Sectors: 1 to 6, 8 to 15, 17 to 23, 25, 27 to 33, 35 to 39.

Richard Jones Management Consultants Inc.
413 Briarwood Drive
Kingston, Ontario K7M 7V2
Contact: Richard Jones
Tel: 613-389-3475
Fax: 613-389-7559
E-mail: rjjones@shadow.kingston.net
Sectors: 20, 29, 31.

Scott Stephenson Consultants Inc.
532 Allview Ave.
Burlington, Ontario
L7T 3T7
Contact: Maurice Stephenson
Tel: 905-847-7997
Fax: 905-634-9476
Sectors: 1 to 40.

Senes Consultants Limited
121 Granton-Drive, Unit 12
Richmond Hill, Ontario
L4B 3N4
Contact: John Peters
Tel: 905-764-9380
Fax: 905-764-9386
E-mail: Peters@senes.on.ca
Web Site: http://www.senes.on.ca
Sectors: 2 to 9, 11 to 18, 20 to 24, 26 to 40

Solomon International Environmental Specialists Inc.
498 Elgin Mills Rd. W.
Richmond Hill, Ontario L4C 4M2
Contact: Phil Solomon
Tel: 905-508-0457
Fax: 905-884-0610
Sectors: 13, 22, 38, 41.

Viridis Environmental Inc.
305 - 280 Brittany Drive
Ottawa, Ontario
K1K 4M4
Contact: Barbara Francis Sweazey
Tel: 613-742-6023
Fax: 613-742-6024
Sectors: 1, 3 to 8, 10 to 14, 16, 21, 22, 28 to 40

Water and Earth Science Associates Ltd.
Box 430
Carp, Ontario K0A 1L0
Contact: Derek Smith
Tel: 613-839-3053
Fax: 613-839-5376
E-mail: wesacarp@fox.nstn.ca
Sectors: 3 to 5, 7 to 13, 17 to 19, 21, 28, 31 to 36, 38.

XCG Consultants Ltd.
50 Queen Street N., Suite 904
Kitchener, Ontario
N2H 6P4
Contact: Richard Rush
Tel: 519-741-5774
Fax: 519-741-5627
E-mail: Richard@XCG.com
www: http://www.sentex.net/-XCG
Sectors: na

Appendix 3

ISO 14001 Assessor Checklist
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- 4.4.2 Training, awareness and competence
- 4.4.3 Communication
- 4.4.4 Environmental management system documentation
- 4.4.5 Document control
- 4.4.6 Operational control
- 4.4.7 Emergency preparedness and response

4.5 Checking and corrective action

- 4.5.1 Monitoring and measurement
- 4.5.2 Nonconformance and corrective and preventive action
- 4.5.3 Records
- 4.5.4 Environmental management system audit

4.6 Management review

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.1 General Requirements							
1. Has the organization established and maintained an environmental management system as per the requirements of the whole of clause 4?							
4.1 Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	NI	US	NA	1	2	3
4.2 Environmental Policy							
1. Has top management defined the organization's environmental policy?							
2. Does top management ensure that the policy:							
a) is appropriate to the nature, scale and environmental impacts of its activities, products or services;							
b) includes a commitment to continual improvement and prevention of pollution;							
c) includes a commitment to comply with relevant environmental legislation and regulations, and with other requirements to which the organization subscribes;							
d) provides the framework for setting and reviewing environmental objectives and targets;							
e) is documented, implemented, maintained and communicated to all employees;							
f) is available to the public?							
				4.2 Totals			
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.3 Planning							
4.3.1 Environmental aspects							
1. Has the organization established and does it maintain a procedure to identify the environmental aspects of its activities, products, or services that it can control and over which it can be expected to have an influence, in order to determine those which have or can have significant impacts on the environment?							
2. Does the organization ensure that the aspects related to these significant impacts are considered in setting its environmental objectives?							
3. Does the organization keep this information up-to-date?							
4.3.2 Legal and other requirements							
1. Has the organization established and does it maintain a procedure to identify and have access to legal, and other requirements to which the organization subscribes directly applicable to the environmental aspects of its activities, products or services?							
4.3.3 Objectives and targets							
1. Has the organization established and does it maintain documented environmental objectives and targets, at each relevant function and level within the organization?							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.2.3 Objectives and targets (continued)							
2. When establishing and reviewing its environmental objectives, does the organization consider:							
a) the legal and other requirements;							
b) its significant environmental aspects;							
c) its technological options;							
d) its financial, operational and business requirements;							
e) the views of interested parties?							
3. Are the objectives and targets consistent with the environmental policy, including the commitment to prevention of pollution?							
4.3.4 Environmental Management Program(s)							
1. Has the organization established and does it maintain (a) program(s) for achieving its objectives and targets?							
2. Does it include:							
a) designation of responsibility for achieving objectives and targets at each relevant function and level of the organization;							
Page Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	**S**	**N I**	**U S**	**N A**	**1**	**2**	**3**
4.3.4 Environmental Management Program(s) (continued)							
2. (continued) Does it include:							
b) the means and time frame by which they are to be achieved?							
3. Where relevant, are program(s) amended to ensure that environmental management applies to projects relating to:							
a) new developments;							
b) new or modified activities, products or services?							
Page Totals							
4.3 Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	NI	US	NA	1	2	3
4.4 Implementation and operation							
4.4.1 Structure and responsibility							
1. In order to facilitate effective environmental management, have roles, responsibility, and authorities been:							
a) defined;							
b) documented;							
c) communicated?							
2. Does management provide resources essential to the implementation and control of the environmental management system?							
3. Does those resources include:							
a) human resources;							
b) specialized skills;							
c) technology;							
d) financial resources?							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.4.1 Structure and responsibility (continued)							
4. Has the organization's top management appointed (a) specific management representative(s) who, irrespective of other responsibilities, has defined roles, responsibilities and authority for:							
a) ensuring that environmental management system requirements are established, implemented and maintained in accordance with this standard;							
b) reporting on the performance of the environmental management system to top management for review and as a basis for improvement of the environmental management system?							
4.4.2 Training, awareness and competence							
1. Does the organization identify training needs?							
2. Does the organization require that all personnel, whose work may create a significant impact upon the environment, have received appropriate training?							
3. Has the organization established and does it maintain procedures to make its employees or members at each relevant function and level aware of:							
a) the importance of conformance with the environmental policy and procedures and with the requirements of the environmental management system;							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.4.2 Training, awareness and competence (continued)							
3. (continued) Has the organization established and does it maintain procedures to make its employees or members at each relevant function and level aware of:							
b) the significant environmental impacts, actual or potential, of their work activities and the environmental benefits of improved personal performance;							
c) their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirements of the environmental management system, including emergency preparedness and response requirements;							
d) the potential consequences of departure from specified operating procedures?							
4. Are personnel performing the tasks which can cause significant environmental impacts competent on the basis of appropriate education, training and/or experience?							
4.4.3 Communication							
1. Regarding environmental aspects and the environmental management system, has the organization established and does it maintain procedures for:							
a) internal communication between various levels and functions of the organization;							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.4.3 Communication (continued)							
1. (continued) Regarding environmental aspects and the environmental management system, has the organization established and does it maintain procedures for:							
b) receiving, documenting and responding to relevant communication from external interested parties?							
2. Does the organization consider processes for external communication on its significant environmental aspects and does it record its decision?							
4.4.4 Environmental management system documentation							
1. Has the organization established and does it maintain information, in paper or electronic form, to:							
a) describe the core elements of the management system and their interaction;							
b) provide direction to related documentation?							
4.4.5 Document control							
1. Has the organization established and does it maintain, procedures for controlling all documents required by this standard to ensure that:							
a) they can be located;							
b) they are periodically reviewed, revised as necessary and approved for adequacy by authorized personnel;							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	NI	US	NA	1	2	3
4.4.5 Document control (continued)							
1. (continued) Has the organization established and does it maintain, procedures for controlling all documents required by this standard to ensure that:							
c) the current versions of relevant documents are available at all locations where operations essential to the effective functioning of the system are performed;							
d) obsolete documents are promptly removed from all points of issue and points of use or otherwise assured against unintended use;							
e) any obsolete documents retained for legal and/or knowledge preservation purposes are suitably identified?							
2. Is documentation:							
a) legible;							
b) dated (with dates of revision);							
c) readily identifiable;							
d) maintained in an orderly manner;							
e) retained for a specified period?							
Page Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.4.5 Document control (continued)							
3. Are procedures and responsibilities established and are they maintained concerning the creation and modification of the various types of document?							
4.4.6 Operational control							
1. Does the organization identify those operations and activities that are associated with the identified significant environmental impacts and which fall within the scope of its policy, objectives and targets?							
2. Does the organization plan these activities, including maintenance, in order to ensure that they are carried out under specified conditions by:							
a) establishing and maintaining documented to cover situations where their absence could lead to deviations from the environmental policy and the objectives and targets;							
b) stipulating operating criteria in the procedures;							
c) establishing and maintaining procedures related to the identifiable environmental aspects of goods and services used by the organization and communicating relevant procedures and requirements to suppliers and contractors?							
Page Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.4.7 Emergency preparedness and response							
1. Has the organization established and does it maintain, procedures:							
a) to identify the potential for, and response to, accidents and emergency situations; and							
b) for preventing and mitigating the environmental impacts that may be associated with them?							
2. Does the organization review and revise, where necessary, its emergency preparedness and response procedures, in particular, after the occurrence of accidents or emergency situations?							
3. Does the organization also periodically test such procedures where practicable?							
Page Totals							
4.4 Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.5 Checking and corrective action							
4.5.1 Monitoring and measurement							
1. Has the organization established and does it maintain, documented procedures to monitor and measure on a regular basis, the key characteristics of its operations and activities that can have a significant impact on the environment?							
2. Do these documented procedures include the recording of information to track performance, relevant operational controls and conformance with the organization's objectives and targets?							
3. Is monitoring equipment calibrated and maintained?							
4. Are records of this calibration and maintenance process retained according to the organization's procedures?							
5. Has the organization established and does it maintain, a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations?							
4.5.2 Non-conformance and corrective and preventive action							
1. Has the organization established and does it maintain, procedures defining responsibility and authority for:							
a) handling and investigating non-conformance;							
Page Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.5.2 Non-conformance and corrective and preventive action (continued)							
1. (continued) Has the organization established and does it maintain, procedures defining responsibility and authority for:							
b) taking action to mitigate the impacts caused;							
c) initiating and completing corrective and preventive action?							
2. Is any corrective or preventive action taken to eliminate the causes of actual and potential nonconformances appropriate to the magnitude of problems and commensurate with environmental impact encountered?							
3. Does the organization implement and record any changes in the documented procedures resulting from corrective and preventive action?							
4.5.3 Records							
1. Has the organization established and does it maintain, procedures for the identification, maintenance and disposition of environmental records?							
2. Do these records include:							
a) training records;							
b) the results of audits and reviews?							
Page Totals							

Comments:

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.5.3 Records (continued)							
3. Are environmental records:							
a) legible;							
a) identifiable;							
a) traceable to the activity, product or service involved?							
4. Are environmental records stored and maintained in such a way that they readily retrievable and protected against damage, deterioration or loss?							
5. Are the retention times for environmental records established and recorded?							
6. Are environmental records maintained, as appropriate to the system and to the organization, to demonstrate conformance to the requirements of this standard?							
4.5.4 Environmental management system audit							
1. Has the organization established and does it maintain, (a) program(s) and procedures for periodic environmental management system audits to be carried out?							
Page Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	NI	US	NA	1	2	3
4.5.4 Environmental management system audit (continued)							
2. Are these environmental system audits carried out in order to:							
a) determine whether or not the environmental management system:							
1) conforms to planned arrangements for environmental management including the requirements of this standard,							
2) has been properly implemented, maintained;							
b) provide information on the results of the audit to management?							
3. Is the audit program, including any schedule, based on the environmental importance of the activity concerned and the results of previous audits?							
4. In order to be comprehensive, do the audit procedures cover:							
a) the audit scope;							
b) the frequency and methodologies;							
c) the responsibilities and requirements for conducting audits and reporting results?							
Page Totals							
4.5 Totals							
Comments:							

4 ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENTS	S	N I	U S	N A	1	2	3
4.6 Management review							
1. At intervals it determines, does the organization's top management review the environmental management system, to ensure its continuing suitability, adequacy, and effectiveness?							
2. Does the management review process ensure that the necessary information is collected, to allow management to carry out this evaluation?							
3. Is this review documented?							
4. Does the management review address the possible need for changes to policy, objectives and other elements of the environmental management system, in the light of:							
a) environmental management system audit results;							
b) changing circumstances;							
c) the commitment to continual improvement?							
4.6 Totals							
Comments:							

Appendix 4

Selecting the Right Registrar?

Two key questions a company should address when seeking ISO 14001 registration are:

- which registrar to select?
- when is the best time to contact a registrar?

Choosing the right ISO 14001 registrar is an important step. There are disadvantages in going to a registrar too early.

Keep in mind, registrars are in business to make money as well as to create customers just like any other business. They sell information and other services in addition to auditing your company relative to an ISO 14001 standard. (In some cases, depending on how it is handled, this may be a conflict of interest.) Registrars can be helpful, but expensive.

As a rule of thumb, you are well advised to benchmark your company against ISO 14001 and have decided on which route you wish to follow to implement the standard before contacting a registrar (See section 9.0, page 120).

Benchmarking will tell you how far away your company is from the standard and the areas you need to improve. Benchmarking can be done by internal staff, if you have trained personnel available. If not, use an external consultant.

Once benchmarked, and you have started the implementation program, then begin the process of selecting a registrar.

First and foremost, shop around for the registrar best suited for you. If you already have ISO 9000 registration, it may be advantageous to use the same registrar. But first check whether the registrar has been accredited by a third-party accreditation body.

Also keep in mind that registration is not a one-time thing. There are annual or six-month maintenance audits required to retain registration. Moreover, there is a contractual requirement to communicate to the registrar any significant changes in your organization which could have an impact on your environmental management system, its policies and procedures.

In other words, you are entering into a long term relationship / partnership with your registrar so be sure the chemistry is right.

Here are 11 considerations to keep in mind:

- ask your customers which registrar they prefer or recognize;
- interview a number of registrars and look for the one who gives you the most added value;
- does the registrar treat you like a customer? Is he responsive to your needs?
- what is the registrar's experience in terms of total number of registrations and their appropriateness to your company?;
- determine the registrar's standing / reputation internationally;
- determine the capability / experience of the auditor(s) who would be assigned to your company;
- determine what kind of market support the registrar gives in promoting their registered companies;
- how accessible would the registrar be to your company, in terms of responsiveness and proximity?;
- will the registrar enter into a confidentiality agreement with you with respect to your company's information which the registrar's auditors have access to?;
- are the registrar's assessors full or part-time employees and are there any potential conflicts of interest?; and
- can I save money if I have the same registrar for ISO 9000 and ISO 14001?

Appendix 5

ISO 14001 Registrars

As of October 25th, 1998, seven registrars have applied for ISO 14000 accreditation from the Standards Council of Canada, of which four have been accredited.

ISO 14001 Registrars

American Accreditation Agency
ANSI –RAB
American Society for Quality
611 East Wisconsin Ave.
PO Box 3005
Milwaukee WI 53201-3005

Contact: Mr. Paul Fortlege
Tel: 1-888-722-2440 (ext. 8712)
Fax: (414) 765-8661
e-mail: paulfortlege@ansi-rab.com
or rab@rab.org

AQSR Canada Inc.
2560 Matheson Boulevard, East, Suite 226
Mississauga ON L4W 4Y9

Accredited: 1998-09-01

Contact: Mr. Raja Rajaram
Tel: 905-624--6004
Fax: 905-624-7213
Toll free: 1-888-866-5666
Email: aqsr@interlog.com

Bureau de normalisation du Quèbéc -
Quality System Registration (BNQ)
333, rue Franquent
Sainte-Foy, Quèbéc G1P 4C7

Tel: (418) 652-2238
Fax: (418) 652-2221

Bureau Veritas Quality International
(North America) Inc. (BVQI)
North American Central Offices
509 N. Main St.
Jamestown NY 14701

Tel: (716) 484-9002
Fax: (716) 484-9003

Det Norske Veritas
DNV Certification Inc.
2000 Argentia Road
Plaze A, Suite 330
Mississauga ON L5N 1W1

Contact: Mr. Paul Bishop
Tel: (905) 567-8878
Fax: (905) 567-8919

Deloitte & Touche
Quality Registrar Inc.
1666 Wyandotte Street East
Windsor ON N8Y 1C7

Contact: Mr. William Dobranski
Tel: 888-258-2240
Fax: (519) 257-7132

Entela, Inc.
Quality System Registration Division
81 Kelfield St., Unit #7
Toronto ON M9W 5A4

Tel: (416) 241-8427
Fax: (416) 241-0682

Intertek Testing Services (ITS)
3210 American Drive
Mississauga ON L4V 1B3

Contact: Ms. Lisa Velanoff
Tel: (905) 678-7820
Fax: (905) 678-7131

KPMG Quality Registrars Inc.
Suite 3300 Commerce Court West
P.O. Box 31, Station Commerce Court
Toronto ON M5L 1B2

Accredited: 1998-05-08

Contact: Mr. Mark O'Sullivan
Tel: (416) 777-8500
Toll Free: 800-862-6752
Fax: (416) 777-8818
Email: mosullivan@kpmg.ca
Website: www.kpmg.ca

Lloyd's Register Quality Assurance Limited
3050 Harvestor Rd.
Burlington ON L7N 3K7

Contact: Mr. Malcolm Smith
Tel: (905) 631-9420
Fax: (905) 631-9430

Quality Management Institute (QMI) 2 Robert Speck Parkway, Suite 800 Mississauga ON L4Z 1H8 Accredited: 1997-04-01	Contact: Mr. Malcolm Phipps Tel: (905) 272-3920 Fax: (905) 272-3942 Email: mphipps@qmi.com Website: www.inforamp.net/~qmi/index.html
SGS International Certification Services Canada, Inc. 5925 Airport Rd., Suite 300 Mississauga ON L4V 1W1 Accredited: 1998-10-12	Tel: 800-636-0847 Fax: (905) 676-9519
Underwriters Laboratories of Canada 7 Crouse Road Scarborough ON M1R 3A9	Contact: Mr. Peter Moore Tel: (416) 757-3611 Fax: (416) 757-8915